FEBRUARY 1960

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Electrical South

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The wiring problems of a modern computer installation
See page 26

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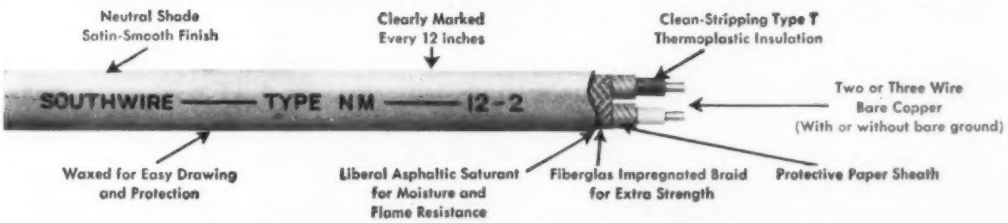

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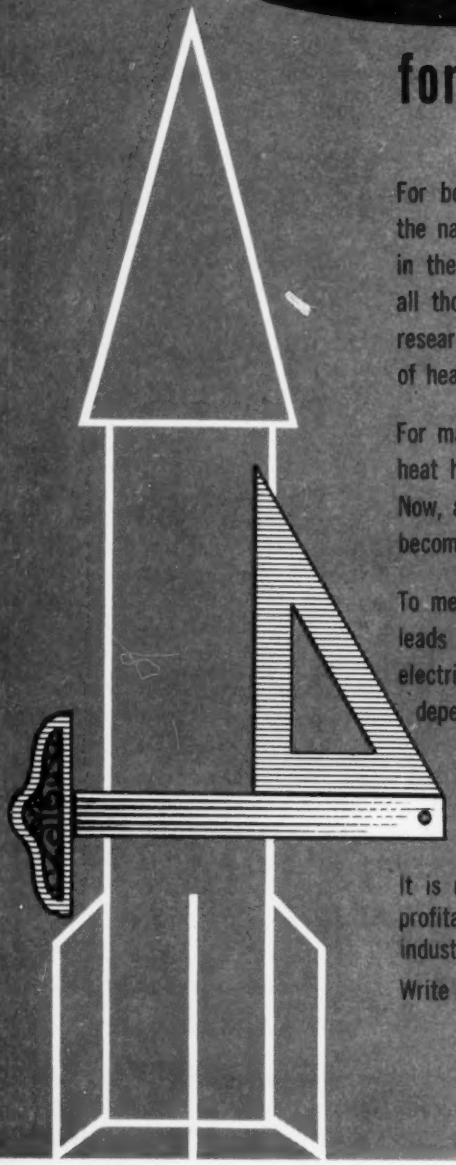

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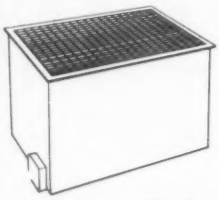

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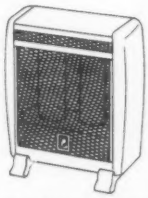

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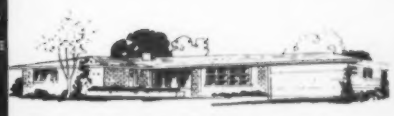

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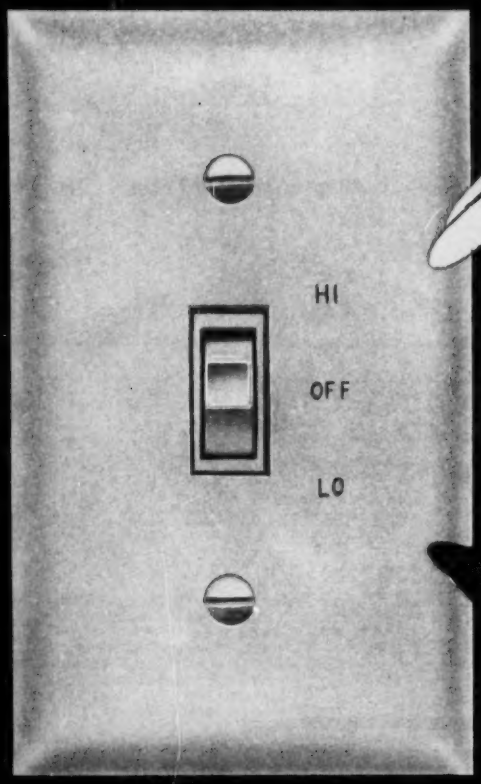

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Electrical South

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Economic comment

by J. Whitney Bunting, Ph.D.

Contributing Economics Editor

Political tempo up

As the announced (and unannounced) candidates for the presidency begin to become more active in the political arena, the economic health of the nation becomes prime discussion material. There is little doubt but that the economic and business policies and affiliations of the Eisenhower administration will make top news, both during the primary period and in the actual election debates later.

It is rather unusual that unlike other recent election periods there are few issues of popular importance that might sweep a candidate into office. In fact, the managers of most candidates will be hard pressed to establish vital grounds for the acceptance of one candidate over another.

In the past years, the two most violent issues have been war (or the imminent threat of war) and the dangers of depression. As the present administration serves out its final year in office, this nation is blessed both with an unprecedented prosperity for the most part, and with the danger of armed conflict at its lowest point in the past twenty years. Thus, the Republican candidate in all probability can use the slogan" Peace and Prosperity" without major contradiction.

Since this is the case at the start of 1960, what issues can be raised and how effective will they be? The most frequently mentioned campaign issues might be listed as follows (without reference to their importance or seriousness):

(1) The administration's farm program, sponsored by Agriculture Secretary Ezra T. Benson, and the current plight of many of the farm areas;

(2) Inflation and the administration's efforts to control it in spite of the inflationary steel settlement;

(3) The potential balancing of the national budget and the possibility of the tax relief out of any surplus therefrom; and

(4) The United States space and missile program and its comparison with Soviet Russian progress in this area.

Important as each of these items may be to the national welfare, none have the mass appeal to voter interest as might be found in the peace and prosperity themes. The great danger to an continuance of the present administration in Washington would come from an alliance of those opposing administration policies in a combination of these issues. This must be a real fear in the minds of Republican policy makers.

Farm problem as an issue

It is certainly true that there is a hard core of opposition to Agriculture Secretary Benson and the program that he has established to place farmers on a strong economic footing. The big question is just how great is the opposition to the Secretary personally, and how much is directed to his program as well.

Secretary Benson has not been the most diplomatic of the Cabinet membership, and he has fought for free enterprise in agricultural marketing throughout his term of office. Such a stand is certain to alienate the support of those farmers who had become used to federal price supports, restricted acreages, and payments for the non-use of farm land. All of these are considered important to the "something-for-nothing" school of economic thought.

On the other hand, farmers have been faring rather well economically and, with the exception of a few depressed spots, the agricultural outlook is more sound than during the period before Benson.

Benson has publicly stated that he will not be in the next Cabinet, regardless of the election outcome. Thus, he has attemped to remove the issue of his own name from the controversy. The Republican candidate may publicly support, or disavow, the Benson program but in all probability will still stand for less government in agriculture and more competitive enterprise. It will certainly be a popular issue.

Although the settlement of the steel controversy was hailed as a strong boost for the administration and for Vice-President Nixon, personally, the later rumblings and evaluation of potential results have modified this to a certain extent. The student of modern business and economics must realize that the end result of the settlement must be a step toward further inflation.

The steel producers have intimated that this is so. Economists have predicted an increase in basic steel prices, too. Thus, it is hard to see how the Republicans can capitalize on an anti-inflation stand since their leaders took such an active part in ending the steel controversy.

Although the public has become increasingly active in voicing opposition to inflation, there is a real question of their degree of opposition to it. In fact, inflation is a relative concept, and public opposition to higher prices can be seriously undermined by continued economic prosperity.

If the degree of prosperity foreseen by economists and business leaders holds good through 1960, then the strength of this otherwise vital issue may be blunted.

Budget balancing

The president's economic report presented a potential surplus in the next federal budget of some four billion dollars. The general public, unfortunately, has little true understanding of the importance of a balanced national budget.

It is also unfortunate that many politicians consider that a budget surplus is an immediate call for tax relief but the fact that the latter is a popular electioneering tool has promoted an unhealthy drive in this direction. If the current Administration's program is maintained then there is the possibility of both debt reduction (presently $285 billion) and some small tax relief in the near future.

The first step is most important in a period of prosperity before other circumstances and emergencies might require heavy federal expenditures.

Dr. Bunting is a well-known economist and educator having special knowledge of the South.

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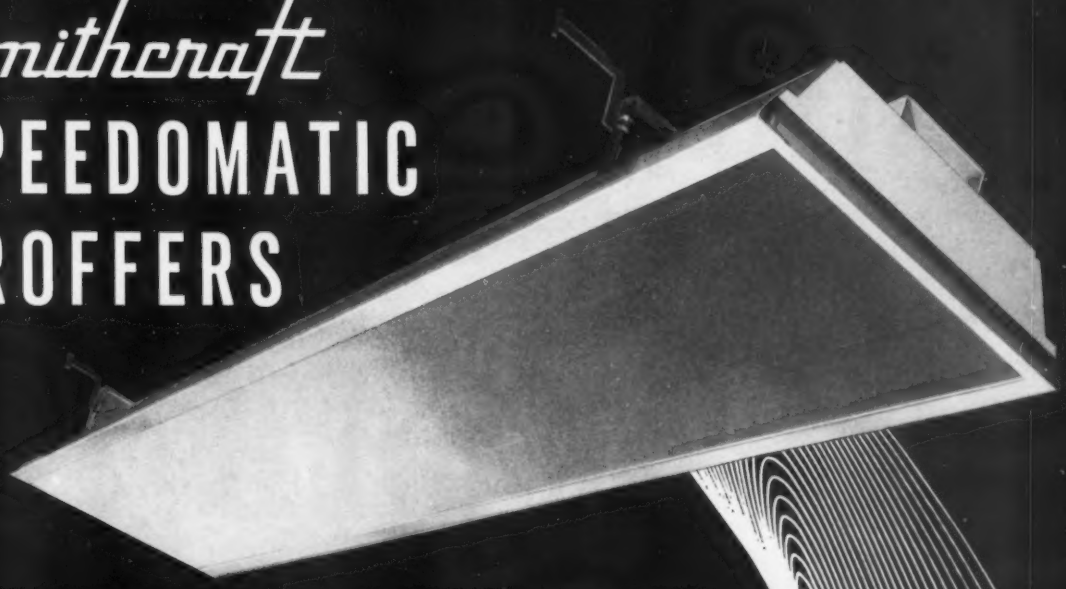

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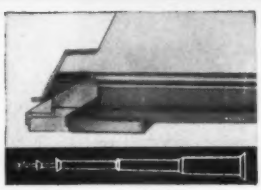

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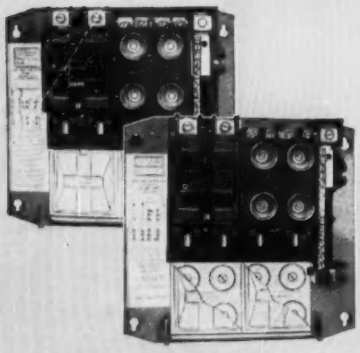

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Write in No. C100 on card, Pg. 17.

ELECTRICAL TAPES—Eight-page Accurate Tape bulletin details data on rubber, friction and plastic tapes. Bulletin features laboratory test results, includes complete packaging information. Immediately available from Accurate Manufacturing Company, Garfield, New Jersey.
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SMALL WIRE STRAPS—Added to the one-hole Viking strap line are three new Midget straps for small wires. The #616 for fastening RX and UF2/14, 2/12, and BX 2/14; the #416 for wires to ¼" OD; and #316 for wires of 3/16" and ¼". These galvanized straps, designed to take several sizes of wires, are featured in literature released by W. W. Cross & Co., Viking Cable and Fastening Devices, Greenville, R. I.
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ELECTRICAL ENCLOSURES — Adjustable and non-adjustable floor boxes, watertight outlets for floor use, and conduit hangers are shown in the 20-page revised catalog #750 available from Fullman Mfg. Co., Latrobe, Pa. Adjacent to each photograph in the catalog are specifications for the product pictured.
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FUSE CUTOUTS — Extra-heavy-duty fuse cutouts of single-vent, small-bore design are described in detail as to operation, advantages, mechanical loadbreak, dielectric values, and ratings in the 8-page illustrated Catalog EHD 1258 offered by Hubbard and Co., 200 South Michigan Ave., Chicago 4, Ill.
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LINE GUN—A two-color, fold-out bulletin illustrated with step-by-step diagrams points out features and advantages of the line gun manufactured by Jet Line Gun Co., Inc., 730 Seigle St., Charlotte, N. C. Also available are loose-leaf filler-type pages describing contents of the line gun kit and the box adapter kit.
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CONDUIT AND DUCTS—Orangeburg Mfg. Co., Inc., 375 Park Ave., New York 22, N. Y. has made available informative literature. Catalog No. 52 includes complete details concerning advantages, installation, and properties of Orangeburg fibre conduit, standard conduit—type I, and Nocrete conduit—type II. Catalog 202 offers specifications, installation data, and diagram of the complete Orangeburg Underfloor duct system. Descriptions and catalog numbers of components are also given.
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CABLE PRODUCTS — Folders, punched for binding filing, and describing four types of Triangle cables have been published by Triangle Conduit & Cable Co., Inc., Triangle and Jersey Ave., New Brunswick, N. J. Products discussed in these folders are the Type RR cable, sheather in Trioprene; asbestos varnished cambric insulated power cables; flexible interlocked armor cable; and control cables.
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HEAVY-DUTY WIRING—Illustrations and detailed descriptions of 27 types of Circle industrial and commercial wiring products are featured in a four-page folder available from Circle Wire & Cable Corp., 5500 Maspeth Ave., Maspeth, N. Y.
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MOTOR STARTERS—Design and construction features of their automatic reduced voltage starters are described in a new bulletin released by Allis Chalmers, Milwaukee 1, Wis. Included is motor control engineered for centrifugal compressors, hammer mills, pumps, large conveyors, large fans, motor-generator sets, and other applications.
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POWER SWITCHES—A new bulletin describing its Type PV power switches, is now available from Line Material Industries, Milwaukee 1, Wis. The bulletin gives complete information on switches rated at 600 or 1200 amperes and having voltage ratings from 7.5 kv to 69 kv.
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TRANSFORMER HOIST — Literature is now available from Morrison-Pelsue Co., 2001 S. Bannock St., Denver 23, Col., describing the MoPeCo Transformer Hoist—a time saving device that permits hanging up to three transformers in thirty minutes.
Write in No. C114 on card, Pg. 17.

UNDERFLOOR DUCT— Formerly known as Howarduct, the Spang Standard Underfloor Duct, is introduced by the Spang-Chalfant Division of the National Supply Co., Two Gateway Center, Pittsburgh, Pa., in an eight-page, illustrated bulletin featuring its simplicity in the distribution systems for electric power, telephones, and inter-coms.
Write in No. C115 on card, Pg. 17.

CIRCUIT BREAKER PANELBOARD—A descriptive folder featuring Quicklag lighting circuit panelboards is available through Frank Adam Co., 3650 Windsor Pl., St. Louis, Mo. This folder includes illustrations, ampere capacities, voltage ratings, and all internal construction features of these panelboards.
Write in No. C118 on card, Pg. 17.

ADEQUATE WIRING — "Bright Ideas for Ladies" is the title of a new booklet from American Metal Mould-

"Count on us for sure . . . from start to finish."

By "us" your Graybar salesman means the team of Graybar experts that serves you, the electrical contractor . . . whether your business be large or small.

This service team knows how to size up a job and evaluate equipment to match the need. They can unravel knotty installation problems.

Often they can make valuable suggestions on tools, for Graybar carries the most complete line of tools available from any electrical distributor.

From start to finish you can count on the Graybar service team . . . Field Salesman, Inside Salesman, Counterman, Specialist. Others too, at Graybar can help *speed your work, reduce your costs, build your business.*

Know them? They're ready to work with you—*today!*

919

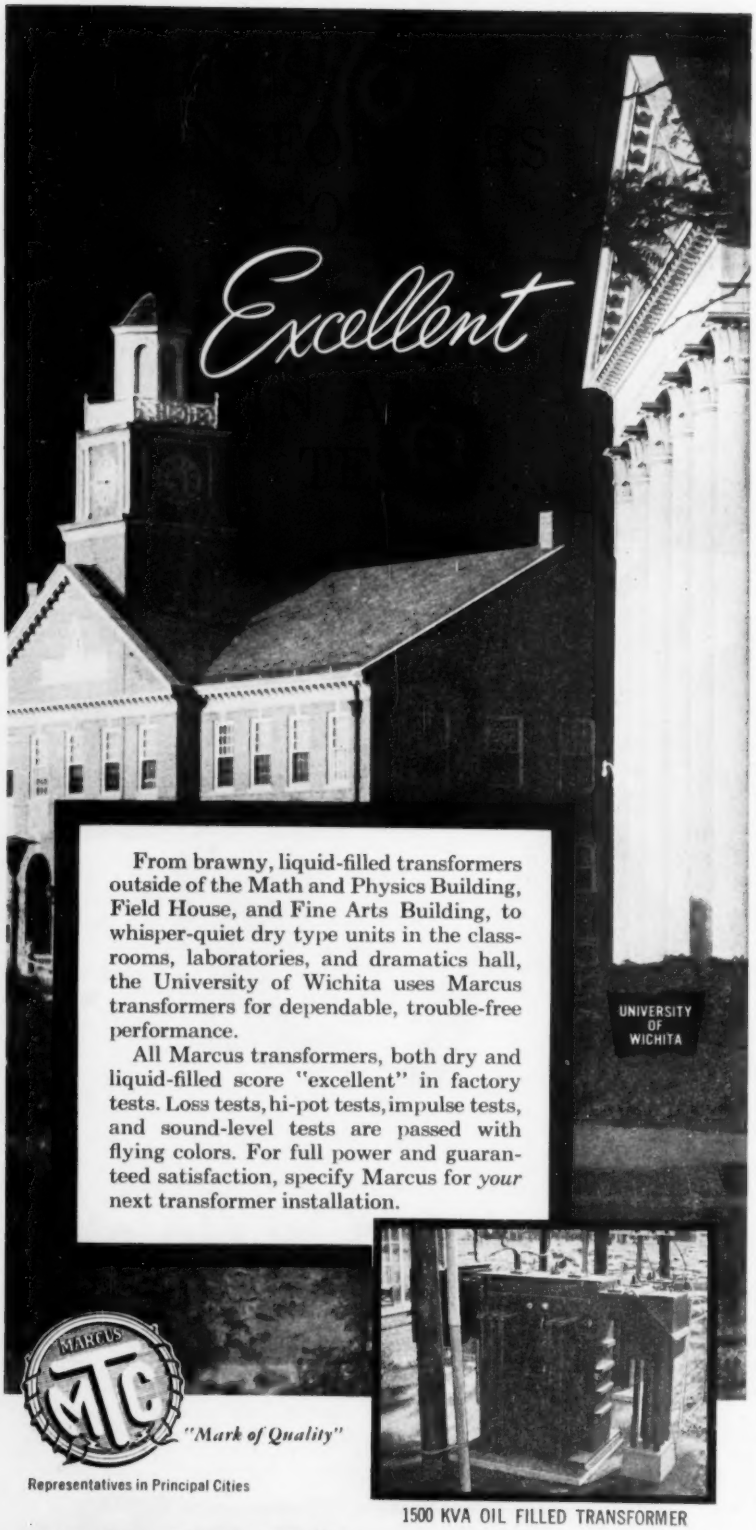
Graybar Service includes: Objective recommendations • On-the-job technical help • Most complete lines • Planned stocks to meet your needs • Expert counter service • Speedy handling of will-calls.

GraybaR

ELECTRIC COMPANY, INC.

420 LEXINGTON AVENUE, NEW YORK 17, N. Y. • OFFICES IN OVER 130 PRINCIPAL CITIES

Everything Electrical GraybaR ELECTRIC COMPANY



From brawny, liquid-filled transformers outside of the Math and Physics Building, Field House, and Fine Arts Building, to whisper-quiet dry type units in the classrooms, laboratories, and dramatics hall, the University of Wichita uses Marcus transformers for dependable, trouble-free performance.

All Marcus transformers, both dry and liquid-filled score "excellent" in factory tests. Loss tests, hi-pot tests, impulse tests, and sound-level tests are passed with flying colors. For full power and guaranteed satisfaction, specify Marcus for *your* next transformer installation.

1500 KVA OIL FILLED TRANSFORMER

MARCUS MTC "Mark of Quality"

Representatives in Principal Cities

MARCUS TRANSFORMER CO., Inc.

RAHWAY, NEW JERSEY

A COMPLETE LINE OF DRY TYPE AND LIQUID-FILLED TRANSFORMERS THRU 5000 KVA

ing Co., 146 Coit St., Irvington 11, N. J. The booklet was prepared by the Armoured Cable Section of the National Electrical Manufacturers Association to acquaint homemakers with the electrical wiring their homes need for full electrical living now and in the future.

Write in No. C119 on card, Pg. 17.

ELECTRICAL TAPES— Plymouth Rubber Co., Inc., Canton, Mass., is offering a new catalog on friction, rubber, and plastic tape. The full color folder gives descriptions, sizes, complete line of Slipknot electrical and packing information on their complete line of Slipknot electrical insulating tapes. Detailed specification data charts are included in the 6-page bulletin.

Write in No. C120 on card, Pg. 17.

SATURABLE REACTORS — This efficient method of regulating and controlling electric power for various manufacturing processes is described in a new folder available from Sorgel Electric Co., 838 West National Ave., Milwaukee 4, Wisc.

Write in No. C121 on card, Pg. 17.

ELECTRIC HEATING — Electromode Division of Commercial Controls Corp., 570 Culver Rd., Rochester 3, N.Y., is now offering their complete line of electric heaters and heating systems for the home. Descrptions, specifications and illustrations are included for wall and portable heaters for large and small rooms, radiant panel heaters, baseboard heaters and radiant cable heat.

Write in No. C122 on card, Pg. 17.

LIGHTING FIXTURES — A new catalog of recessed lighting fixtures has been released by Atlas Electric Products, 319 Ten Eyck St., Brooklyn 6, N. Y., manufacturers of Atlite lighting equipment. The 24-page, color catalog features over 100 new lighting fixtures that have been added to the Atlite line.

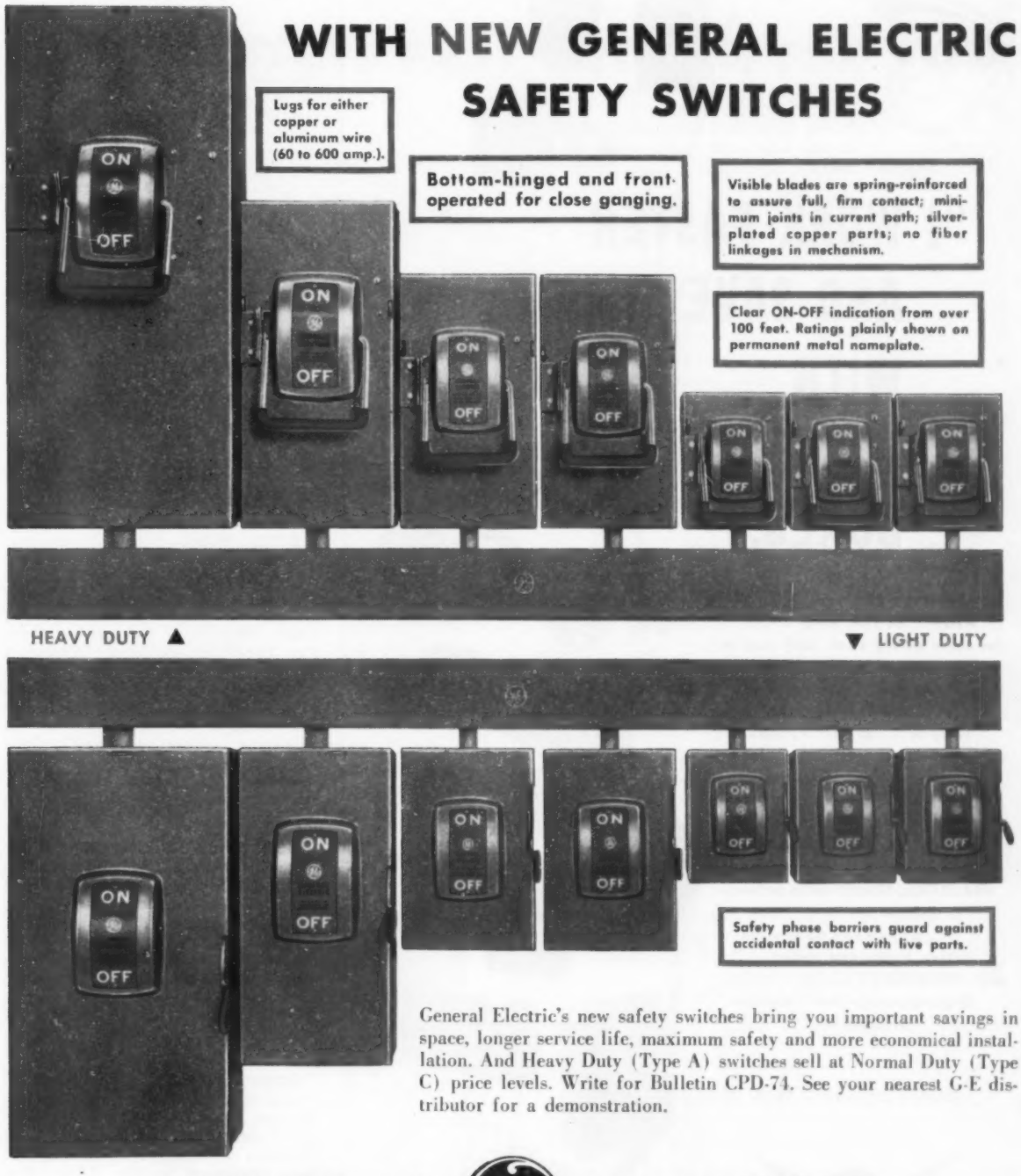
Write in No. C123 on card, Pg. 17.

DISTRIBUTION EQUIPMENT — Kuhlman Electric Co., P. O. Box 288, Birmingham, Mich., offers an eight-page catalog, CS-201, describing their line of distribution transformers of the single phase conventional type, 167 kva and below. Also available is an information sheet, CS-204, on the Kuhlman externally operated series-multiple switch for pole-type transformers 5-167 kva.

Write in No. C126 on card, Pg. 17.

SAVE SPACE

WITH NEW GENERAL ELECTRIC SAFETY SWITCHES



Lugs for either copper or aluminum wire (60 to 600 amp.).

Bottom-hinged and front-operated for close ganging.

Visible blades are spring-reinforced to assure full, firm contact; minimum joints in current path; silver-plated copper parts; no fiber linkages in mechanism.

Clear ON-OFF indication from over 100 feet. Ratings plainly shown on permanent metal nameplate.

Safety phase barriers guard against accidental contact with live parts.

General Electric's new safety switches bring you important savings in space, longer service life, maximum safety and more economical installation. And Heavy Duty (Type A) switches sell at Normal Duty (Type C) price levels. Write for Bulletin CPD-74. See your nearest G-E distributor for a demonstration.

GENERAL ELECTRIC

Circuit Protective Devices Dept., Plainville, Conn.

SPARKY SAYS:

"I WORK FASTER AND SAVE TIME WITH WIEGMANN BOXES,"

BECAUSE:

There's a RIGHT STYLE AND TYPE for every wiring need, and they're TOP QUALITY TOO!

There's a generation of skill and experience in every WIEGMANN PRODUCT. All are made of full gauge steel to meet code requirements.

Switch boxes have the finest electroplated finish in the industry.

For appearance, efficiency and utility, there's none better.

Believe me — a chap can do the job better, faster and easier with WIEGMANN wiring supplies. Order through your electrical wholesaler.

E. M. WIEGMANN & COMPANY, INC. FREEBURG, ILLINOIS

(located in metropolitan St. Louis means fast delivery everywhere)

LAMP GUIDES — Sylvania Lighting Products, 60 Boston St., Salem, Mass., offers a series of guide books containing general information, technical data, and catalog listings on their lines of fluorescent lamps, incandescent lamps, and mercury lamps.

Write in No. C128 on card, Pg. 17.

FASTENING DEVICES — The Paine Co., 501 Westgate Rd., Addison, Ill., offers a new catalog on their line of hanging and fastening devices. The 31-page bulletin is indexed for easy reference, and contains information on design features, prices, and packaging.

Write in No. C129 on card, Pg. 17.

WIRING EQUIPMENT— Keystone Manufacturing Co., 23328 Sherwood Road, Warren, Mich, has issued a new catalog (158 March 1, 1958) giving complete specifications and illustrations on their line of wiring installation equipment. Included in the 70-page catalog are wireways and auxiliary fittings, cutout boxes, outlet boxes, switch boxes, and cabinets, giving Code requirements, and price sheets.

Write in No. C130 on card, Pg. 17.

STEEL WIRE—Technical information on Alumoweld, a newly developed aluminum-covered steel wire and strand, is contained in a 12-page catalog, just issued by the Wire and Cable Division of Copperweld Steel Co., 322 Frick Building, Pittsburgh 19, Pa. Illustrated and documented with engineering data, the colorful catalog provides a complete working knowledge of this new material—its properties, advantages, applications and construction practices.

Write in No. C142 on card, Pg. 17.

ELECTRICAL FITTINGS — A 40-page illustrated catalog and price list on the Gedney line. Shown and listed are conduit, threaded entrance, SEC, EMT and ground fittings and box connectors for both armored and non-metallic cables. Copies are available from Gedney Electric Co., RKO Bldg., Radio City, New York 20, N. Y.

Write in No. C143 on card, Pg. 17.

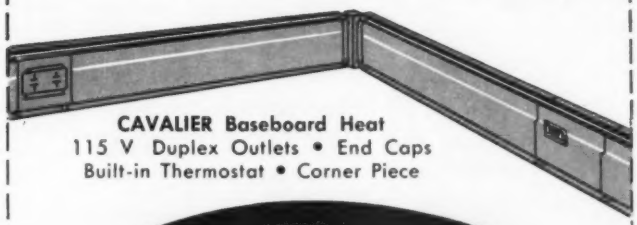
CONSTRUCTION ANCHORS — "Anchoring for Power and Communication Lines," a completely illustrated manual on improving line construction with better anchoring, has been published by the Advertising Dept., the A. B. Chance Co., Centralia, Mo. The 25-page booklet shows how to install the right anchor at the right place in the right way.

Write in No. C144 on card, Pg. 17.

Electric heat boom in

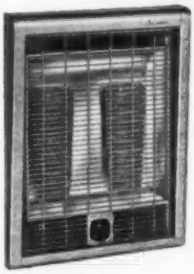
Golden 60's

OFFERS FAST GROWTH FOR YOU!

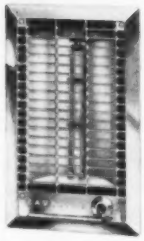


CAVALIER Baseboard Heat
115 V Duplex Outlets • End Caps
Built-in Thermostat • Corner Piece

Cavalier
AUTOMATIC
ELECTRIC HEAT



CAVALIER
Wall Insert
1 to 5 KW



CAVALIER Bathroom
Automatic and
non-automatic
120 and 240 volt

CAVALIER
Radiant
Cable

CAVALIER Portable
2, 3, 4 KW

HEAT BETTER ELECTRICALLY

NEMA

Forecasts say that more people will have more money than ever before . . . 1960 personal income is estimated at 395 billion dollars . . . an all time high.

People spend money for the things they want . . . and they want Cavalier Automatic Electric Heat — the cleanest, most convenient, carefree, safest heat ever devised. It is easily installed in new or existing construction. Right now, people are making their plans to build or remodel as soon as the weather opens up. Now is the time for you to get your share of this big extra volume . . . and if you'd like some merchandising help, all you have to do is ask us.

Electric heat has made faster gains than any other heating method. In 1959 electric heat made another giant leap ahead . . . for 1960 even more utilities plan hard hitting promotions.

Cavalier, a pioneer in electric heat, has a complete line, thoroughly engineered, developed and refined by years of use all over the U.S. Cavalier builds to highest quality standards, stays ahead of competition by research and proven new designs.

All the leading electrical magazines, trade associations and merchandising studies point out the exceptional opportunities for new volume and profits through sales and installation of electric heat equipment. If you would like help in getting started in this, simply let us know. A wealth of experience and merchandising service is available from Cavalier . . . and Cavalier sells only through trade channels.

QUALITY SINCE 1865

Highest Quality Electric Heating Equipment sold only through trade channels to safeguard the consumer, the contractor and the distributor.

CAVALIER CORPORATION
ELECTRIC HEATING DIVISION
CHATTANOOGA 2, TENNESSEE

FIRST

- *in quality construction*
- *in engineering advances*
- *in safety*
- *in sales making features*

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Building: 2 Broadway, N.Y.C. – 30 story and penthouse
Owner and General Contractor: Uris Brothers
Architect: Emery Roth & Sons
Electrical Engineer: Alfred J. Kleinberger
Electrical Contractor: Fischbach & Moore, Inc.
LEVITON
#5521 QUIET SWITCHES
A full line of 15A and Heavy Duty 20A AC Quiet Switches

IN IMPORTANT STRUCTURES EVERYWHERE . . . SPECIFICATION GRADE

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Wiring Devices

ARCHITECTS, ELECTRICAL ENGINEERS, ELECTRICAL CONTRACTORS everywhere specify Leviton. You, too, can take advantage of Leviton's complete line of Specification Grade wiring devices. Investigate this comprehensive line yourself! Sold thru authorized electrical distributors.

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Chicago • Los Angeles • Leviton (Canada) Limited, Montreal

For your wire needs, contact our subsidiary: AMERICAN INSULATED WIRE CORPORATION

ELECTRICAL FITTINGS—Blackhawk Industries, Dubuque, Iowa, offers a complete catalog of electrical conduit and cable fittings. Also a special publication giving detail drawings and instructions for installing service entrance masts on low or ranch type buildings.
Write in No. C146 on card, Pg. 17.

WIRE PULLING LUBRICANT — Illustrated six-page folder showing the advantages of an improved Y-Er Eas wire pulling lubricant is available from Electro Compound Co., 4145 W. 150th St. Cleveland 11, Ohio.
Write in No. C147 on card, Pg. 17.

GENERAL CATALOG — General catalog of Royal Electric Corporation, Pawtucket, R. I., covering flexible, service and lamp cords, cord sets, extensions, trouble lights, wiring devices and fuses is available to wholesalers. Dealers catalogs may be secured from Royal distributors.
Write in No. C148 on card, Pg. 17.

CARBON PRODUCTS—A 28-page catalog on Motor and Generator Brushes and carbon products telling how to order brushes, grade recommendations, characteristics, and description of brush grades, is available from the Helwig Co., 2536 North 30th St., Milwaukee, Wis.
Write in No. C149 on card, Pg. 17.

POWER BENDER — The lightweight hydraulic power bender #884, manufactured by Greenlee Tool Co., of Rockford, Ill., is described in a new bulletin issued by the company.
Write in No. C150 on card, Pg. 17.

ELECTRICAL EQUIPMENT—The Wadsworth Electric Mfg. Co., Inc., Covington, Ky., has issued a new catalog 58' Guide, containing data on their line of Safety Switches, Service Equipment, Distribution Panels, "E-Z-RED" Circuit Breakers, interchangeable and non-interchangeable, also wiring troughs.
Write in No. C151 on card, Pg. 17

SELECTING FUSES — A 12-page descriptive handbook Fuseology tells how to get safest most dependable, trouble-free electrical protection from fuses. Contains useful information on selecting right size and type of fuses —how to stop needless blows—avoiding poor contact and other troubles. Issued by Bussmann Mfg. Co., University at Jefferson, St. Louis 7, Mo.
Write in No. C152 on card, Pg. 17.

INFORMATION CENTER

BOOKLETS • NEW PRODUCTS • ADVERTISEMENTS

Help yourself to free literature and more details on any product mentioned in this issue.

Instead of writing a dozen different manufacturers for free literature and more information on products, tools, or services, just insert on the cards below the appropriate key numbers of the items in which you are interested. These cards may be used to get information on products mentioned in the following departments (see Contents Page for page number):

Catalogs and Bulletins — New Electrical Products
New Utility Equipment — Manufacturers' Literature

Be sure to print or write legibly your name and address—drop it in the nearest mail box and

ES pays the postage!

FEBRUARY 1960

Send free information on these NEW PRODUCTS and/or services (fill in key numbers):

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Company_____ Page_____ Company_____ Page_____

My Name _____ Position_____
My Company's Name _____
Address (number and street) _____
City _____ Zone_____ State_____

FEBRUARY 1960

Send free information on these NEW PRODUCTS and/or services (fill in key numbers):

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Send this FREE LITERATURE (fill in key numbers):

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Send free information on these ADVERTISEMENTS:

Company_____ Page_____ Company_____ Page_____
Company_____ Page_____ Company_____ Page_____

My Name _____ Position_____
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Address (number and street) _____
City _____ Zone_____ State_____

These cards can help you get valuable information

Postage Will be Paid by Addressee

No Postage Stamp Necessary If Mailed in the United States

BUSINESS REPLY CARD

FIRST CLASS PERMIT NO. 582, SEC. 34.9, P. L. & R., ATLANTA, GA.

Electrical South

806 PEACHTREE ST., N. E.

ATLANTA 8, GEORGIA

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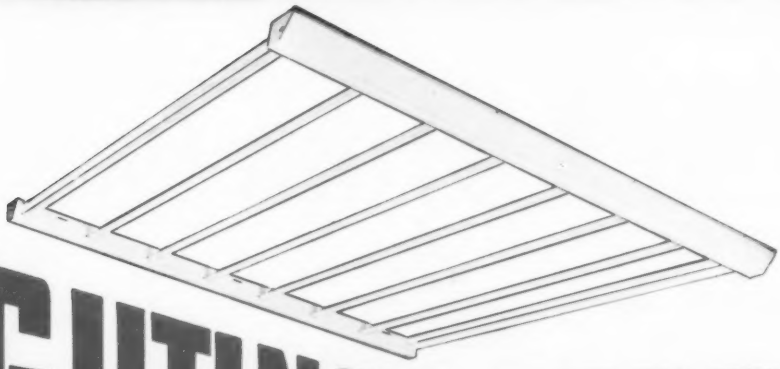
Electrical South

806 PEACHTREE ST., N. E.

ATLANTA 8, GEORGIA



LIGHTING A STORE?

. . . we suggest the "L & P" LINELITE

U. L. Approved

APPLICATION:

Specifically designed for highlighting special areas, or over-all ceiling illumination. Also used in conjunction with or above suspended ceilings.

TYPE:

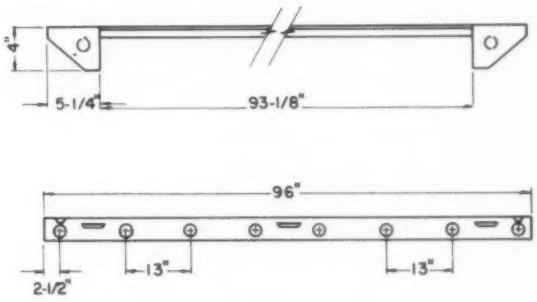
Slimline only. Four, six, eight, ten or twelve lamp. Unshielded general distribution.

CONSTRUCTION:

Heavy gauge steel construction. Spring loaded push type sockets. Completely wired, requires mounting of spacers only. Ballast housing cover plates easily removed for maintenance. Special lamp spacing available. Ample knockouts. Sine receptacles in ends available.

MOUNTING:

Surface or suspended mounting. Designed for continuous row or single unit installation.



Cat. Series EF

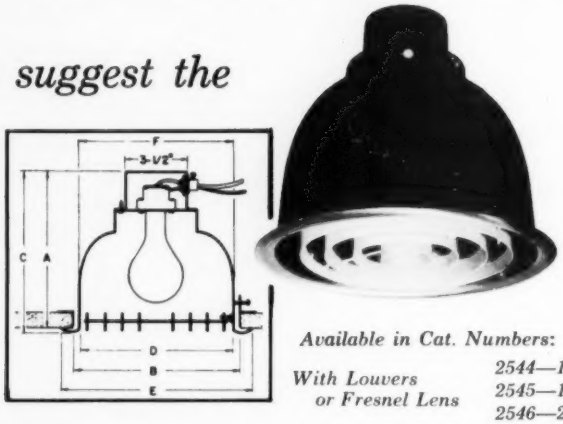
For catalog and price sheets, write or phone today to

LIGHT & POWER UTILITIES CORP.

1035 FIRESTONE BLVD. • MEMPHIS, TENNESSEE

LIGHTING A STORE?

. . . we suggest the



Available in Cat. Numbers:

With Louvers or Fresnel Lens

2544—100 W
2545—150 W
2546—200 W
2547—300 W

L & P DELTA DOWN LIGHT

All the quality, tested performance and economy that have earned Light & Power an enviable reputation in fluorescent fixtures are also available in the complete L & P Delta line of incandescent fixtures.

For your next store installation check these features of the Delta Down Light before you select your incandescent fixtures!

1. One piece heavy gauge spun aluminum housing, painted Matte black.
2. Polished aluminum reflector.
3. Hinged lens retainer.
4. Available with Corning Pyrex lens—or louvered.
5. Fixture well ventilated for cooler operation.
6. Face plate is Brushed Satin Aluminum.
7. On louvered fixture, louvers are baked white enamel.
8. All steel parts Bonderized and baked to 370° to assure permanent finish.
9. Heavy duty porcelain socket with 4½ ft. #14 A. F. wire.

For catalog and price sheets, write or phone today to

DELTA delta incandescent division

LIGHT & POWER UTILITIES CORP.

1035 FIRESTONE BLVD. • MEMPHIS, TENN.

Distributed by Wholesale Dealers Only

L & P LIGHT & POWER UTILITIES CORP.

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Representative Near YOU!

For further information and prices on L & P fluorescent fixtures—standard or "custom-made"—check the following list, and phone or write the L & P representative nearest you:

N. B. Nichols
2509 Bishop
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Craig-Owen
306 E. 11th St.
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C. V. Hammon
845 Southwest 52nd St.
Oklahoma City, Oklahoma

Irving Milow
415 Clover St.
Rochester, New York

W. J. Milner
3627 Peachtree Rd., N. E.
Atlanta, Georgia

J. Louis Weyhing
1914 Rutherford Ave.
Louisville, Kentucky

Irvin Spero
4142 Stillmore Rd.
South Euclid, Ohio

Howard E. Johnson
2976 Randy Lane
Dallas, Texas

Arthur H. Swartz
5003 Kelso St.
Houston, Texas

J. F. Hisserich
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St. Louis, Missouri

Joe E. Pearce & Associates
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Indianapolis, Indiana

Associated Manufacturers Agents
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Bill Sylvester
2144 Welton St.
Denver, Colorado

Newell L. Willard
3625 Ivy
Denver, Colorado

J. A. Goode Company
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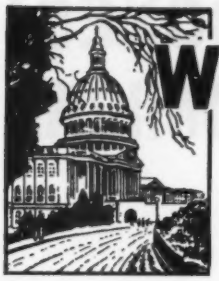
Detroit 38, Michigan

Gerald Preacher
1225 Pickens
Columbia, South Carolina

Light & Power Utilities Corp.
1035 Firestone Blvd.
Memphis, Tennessee



Washington report

By Jack James

Digest of Washington news of special interest to the electrical industry

Record construction predicted by AGC

CONSTRUCTION value leaped to a record $73 billion in 1959 and should soar over $76 billion in 1960. This is the year-end statement and prediction of the Associated General Contractors of America.

The AGC says that in 1959 there was $54 billion in new construction and $19 billion in maintenance and repair. In 1960 new work will boom over $56 billion, the AGC predicts, and repairs, to $20 billion.

Here are some of the AGC predictions by major categories for 1960:

Housing: A 4 per cent decrease to $21.4 billion despite an increase in apartment house construction.

Commercial: The 1959 office building boom will continue. The 1959 housing boom will cause heavy demand for suburban stores and commercial buildings. The result: a 15 per cent jump to about $4.5 billion.

Religious structures: Their value will hit $1 billion for the first time.

Public utilities: Resumption of climb, possibly reaching $5.5 billion.

Industrial: After a sharp two-year decline, a 30 per cent leap to $2.5 billion.

Schools: A mild recovery to $2.8 billion: 70,000 new public elementary and secondary school classrooms.

Military: About the same as 1959, $1.5 billion with a shift toward missile bases.

Costly coffee breaks eliminated in New York

EVERYTIME an electrician in New York City drinks a ten-cent cup of coffee on coffee break it costs the electrical contractor $1 lost time. So all time wasters must go says Harold A. Webster, board chairman for the electrical contractors' association in New York. The reason: a two-year contract renewal ups IBEW Local 3 members' pay to $4.40 an hour pay plus $1.78 an hour fringe benefits by 1961. The total: $6.18 an hour.

Steel strike shortage held to be foreseeable

A CONTRACTOR who took a Government lighting construction job at an airport after the recent steel strike began and could not complete the job on schedule because a steel shortage was denied an extension of time. Presumably, the contractor is liable for damages for delay.

The Federal Aviation Agency contracted the job. Then, after the strike caused delay, the Agency asked U. S. Comptroller General Joseph Campbell whether it could give the contractor an extension.

Commenting on the standard clause in Government contracts that excuses contractors delayed by unforeseeable causes, Campbell declared:

"Thus contractors know they are not to be penalized for unexpected impediments to prompt performance . . . .

"The purpose of the proviso, to protect the contractors against the unexpected, and its grammatical sense, both mitigate against holding that the listed events [fires, quarantine, floods, epidemics, freight embargoes, strikes, etc.] are always to be regarded as unforeseeable, no matter what the attendant circumstances are . . . .

"Not every fire or quarantine or strike or freight embargo should be an excuse for delay under the proviso. A strike may be an old and chronic one whose settlement within an early period is not expected. In any of these situations there would be no possible reason why the contractor, who of course anticipated these obstacles in his estimate of times and cost, should have his time extended because of them." (Neither the contractor nor job was named.)

Electrical workers runners-up in safety

ELECTRICIANS in the construction industry are runners-up in the safety race of 1958, latest figures from the Bureau of Labor Statistics, U. S. Department of Labor, reveal.

The injury rate for electricians was 23.3 injuries per million man hours worked in 1958. Three out of 1,000 injuries resulted in deaths, and 31 out of 1,000 in permanent harm; 966 out of 1,000 men injured fully recovered. On an average, the men who were injured recovered and were fit for work after 69 days.

Safest of the construction trades was painting and wallpapering with a rate of 21.9 injuries per million man hours; most dangerous was roofing and sheet metal work with a 44.8 rate. Average rate for the construction trades was 31, the same as it was the two preceding years.

Business motive makes gifts taxable

INCOME TAX time rolls around. The Internal Revenue Service with payola on its mind says that it will keep a close watch on business gifts.

If you gave your employees cases of whisky, cash bonuses, or substantial gifts of any kind during 1959, you might want to remind them that Uncle Sam expects to be cut in.

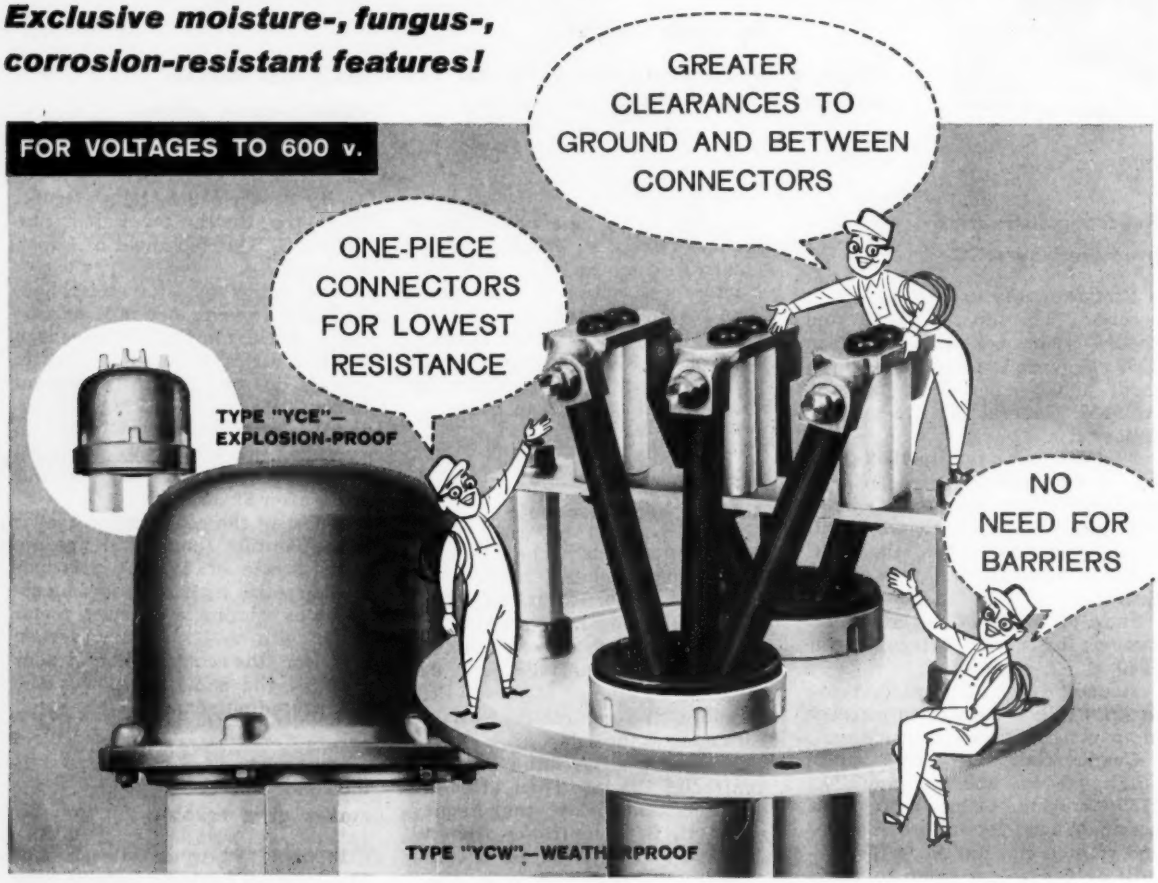
The rule on gifts from employer to employees is clear. A turkey, ham, or other item of merchandise of nominal value is not considered part of wages and so is not taxable, the Service declares. But when the gifts are substantial (like a case of whisky) then the Service wants to collect income tax.

When one businessman gives another a present, the problem becomes confusing. "If there is any business motive, the gift is taxable," the Internal Revenue Service asserts. "The only gifts not

(Continued on page 109)

NEW! O.Z. PULL-N-SPLICE BOXES!
CONVENIENT·COMPACT·ECONOMICAL

Exclusive moisture-, fungus-, corrosion-resistant features!


FOR VOLTAGES TO 600 v.
GREATER CLEARANCES TO GROUND AND BETWEEN CONNECTORS
ONE-PIECE CONNECTORS FOR LOWEST RESISTANCE
TYPE "YCE"— EXPLOSION-PROOF
NO NEED FOR BARRIERS
TYPE "YCW"—WEATHERPROOF

O.Z. Pull-n-Splice Boxes mark a significant advance in pull box construction!

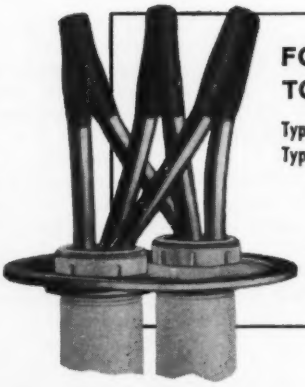
Their highly compact size saves *more space than ever!*

Their more efficient design means *new savings in installation time and labor!*

Their moisture-, fungus-, and corrosion-resistant features mean long, trouble-free service.

Still, with all their features, the new O.Z. Pull-n-Splice Boxes are *smaller* — and *cost far less* than conventional pull boxes . . . even late model *competitive* types! And, you get a bonus in high quality materials and workmanship so characteristic of *all* O.Z. products!

For complete information on these and the many other O.Z. products that mean more for you, call your local O.Z. distributor, or write to the company.



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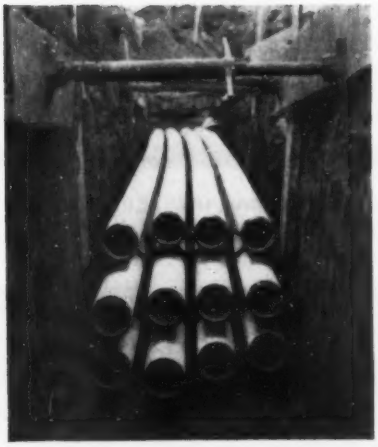
Transite Ducts can be laid directly in trench without concrete envelope. Or if ductbank is to be concrete enclosed—thinner walled Transite Duct may be used. In all other respects both heavy-wall and thin-wall Transite Ducts are identical.

Transite Ducts save on the job and after!



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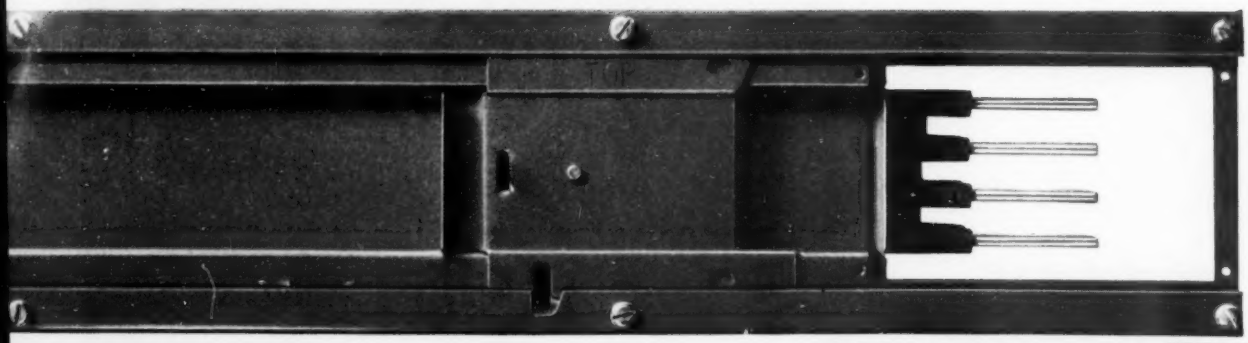
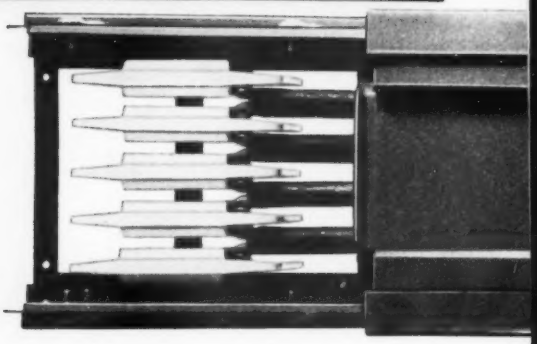
INTRODUCING NEW



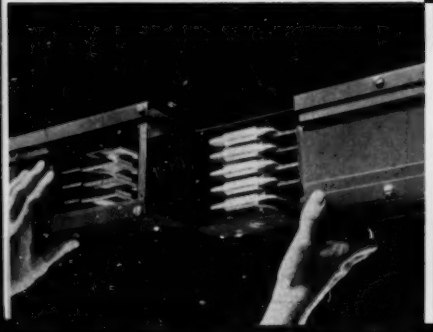


The safest, fastest-to-install plug-in duct ever designed!

Now BullDog, the originators of Bus Duct systems, gives you new safety for plant personnel plus new installation speed and economy with new XL BUStribution duct! Completely Butyl covered aluminum bus bars give true dead-front construction. Crews can now install more duct in a day than ever before. Superior engineering provides low voltage drop . . . down to half that of other plug-in duct systems . . . plus unexcelled short circuit rating. BullDog gives you completely engineered fittings. You can get everything you need from a single source —your local BullDog distributor. Call him—he'll give you a demonstration of all the XL safety and installation features.

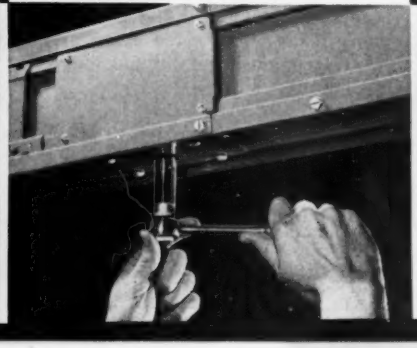
FAST INSTALLATION

Keyed bus ends align themselves positively, instantly, without fumbling or wasted time. You can position sections as fast as you can handle them!



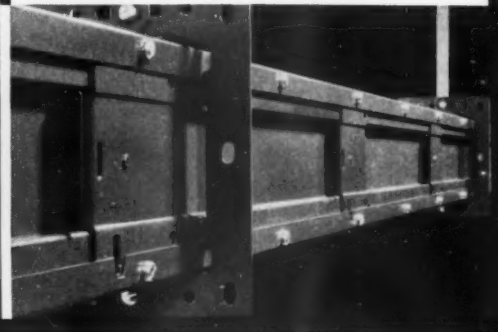
EASY INSTALLATION

This one integral bolt locks POSITIVELY . . . holds keyed bus ends under a ton of pressure. The fully insulated bolt spins tight *fast*. Joints stay locked!



ECONOMICAL INSTALLATION

You need only half as many hangers as usual. Ten-foot supporting spans cut number of hangers *and the time needed to install them* by 50%.



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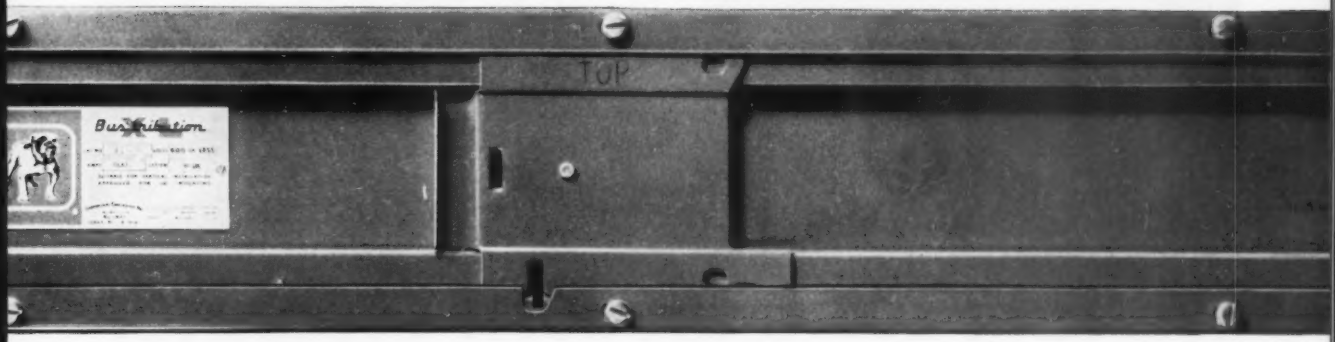
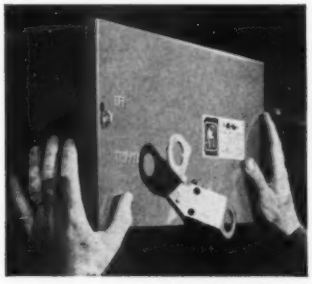
BUStribution® DUCT





The new **XL SAFETY-PLUG** is faster, safer to use than any other plug!

XL Safety-Plug has new, simplified design. You can plug-in on XL duct in seconds. It has safety features not found on any other plug. Plugs are available which prevent installation or removal when plug handle is in the "on" position. You can plug in from either side of the duct, in all duct sizes from 225 through 1000 amps. You can use all plug-in openings at the same time, if desired.

When you see your BullDog distributor about XL duct, examine the Safety-Plug he has on display, too. Here's an electrical team you can depend on to do the job better in every way!

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Wilson Electrical Equipment Co.
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125 Bennett St., N. W., P. O. Box 2308, Station D,
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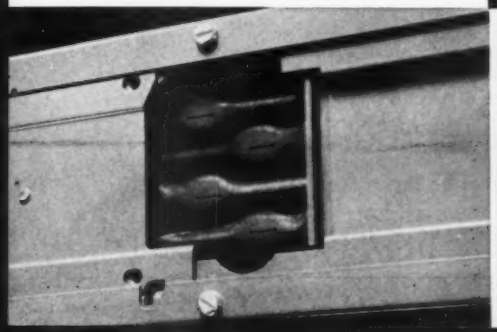
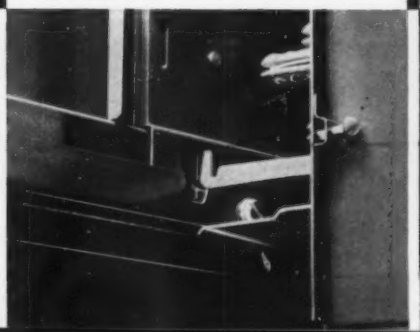
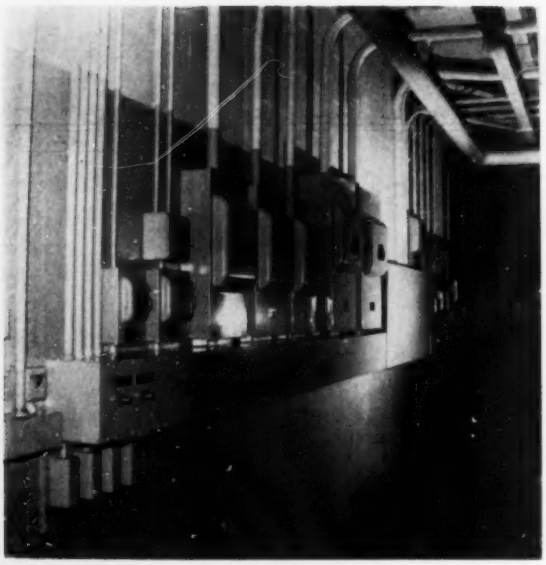
DEAD-FRONT SAFETY
Each bus bar has full-length Butyl insulation, even in bus plug openings. XL BUStribution Duct is the world's safest duct to plug into, to work around.

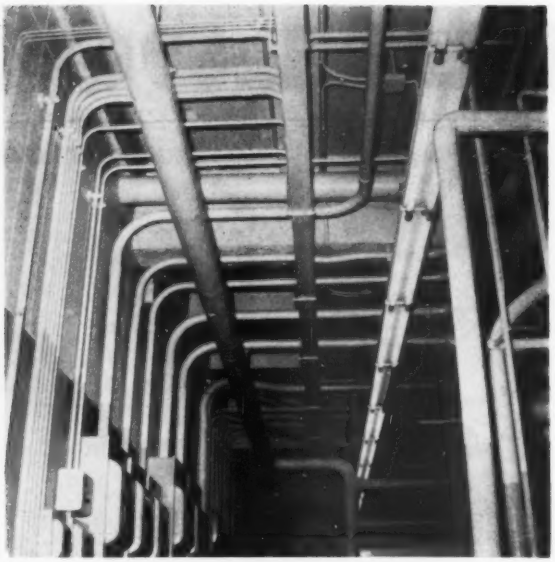


PERSONNEL SAFETY
Safety door covers the opening . . . slides back when safety interlock finger is in position. Plug cannot be removed or installed when safety door is open.



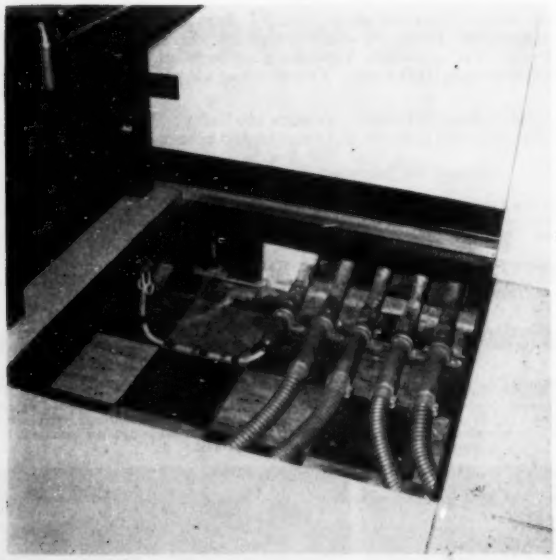
EQUIPMENT SAFETY
SAFETY PLUGS cannot be installed or removed when in the "on" position . . . exclusive design positively protects against arcing, safeguards equipment.





Power for the computer originates from a separate transformer and two 400-ampere circuit breakers. The two photos above show feeder switches adjacent to computer room. The two push buttons shown are arranged to quickly open the main circuit breakers in the event of an emergency situation.

Wiring for a modern computer



These two views show how the new floor was installed over the old leaving a space underneath for branch circuits. These are shown with the bonding conductors to ground the new floor supporting system. At right, a 100-ampere plug and receptacle located under floor at the computer.

By Jack B. Walden

Master Electrician
Dallas, Texas

This article should be especially helpful to the following readers:

- Electrical Contractors
- Electric Utilities
- Electrical Wholesalers
- Electrical Inspectors
- Industrial Engineers
- Consulting Engineers

◆THE INCREASED USE in recent years of large electronic computers for the handling of modern business accounting and for the making of complicated scientific evaluations and calculations, has been almost phenomenal. As the usage has increased, the size and capabilities of the computers have also increased. This is the story of the installation of one of the largest electronic computers in an existing structure. The installation site is the second floor of the 29-story Mobil Building, in Dallas, Texas, which for many years was known as the Magnolia Building. Complete engineering and job supervision was provided by Mobil Building management personnel.

The computer selected by Mobil Oil Company was International Business Machine Company's EDPM #705, consisting of thirty-two inter-connected components. The total weight of machines is 50,000 lbs., with a power consumption of 155 kva, and a heat rejection in excess of 300,000 BTU per hour. The fact that all of this weight and capacity is concentrated in a floor area of 2600 square feet, presented engineering problems of great magnitude.

Raised floor system

A special raised floor system was installed on top of the existing floor consisting of steel channel framing, set on leveling jacks, with removable, four-foot-square laminated panels laid on top. An equipment grounding conductor was bonded to the steel framing system. The purpose of the raised floor is four-fold:

(1) To provide a more equal distribution of weight and floor loading.

(2) To provide wiring space with nine inches of clearance below the machines to permit an adequate bending radius for the large inter-connecting cables.

(3) To provide a free area which could be used as a supply air plenum for machine cooling.

(4) To provide a maximum of flexibility for future installation of additional components, or rearrangement of existing components, especially to give easy access to cables and connections.

The existing plaster ceiling was removed, and in its place was installed a suspended T-bar and metal pan system. Recessed fluorescent lighting fixtures were installed to provide 50-footcandle illumination. Inasmuch as the lighting fixtures, the supply air grilles, and the return air grilles snap into the T-bar system, rearrangement of the overhead system can be easily accomplished when a change in the grouping of the computer components sets up a different lighting or air conditioning requirement.

Feeders and branch circuits

The computer was designed to match the building power characteristics of 208 volts, three-phase. A separate transformer was set in the transformer vault to serve the computer only, for the purpose of assuring a stabilized voltage, and to avoid line transients which might develop on the main building transformer bank from X-ray and diathermy equipment which is served therefrom.

A new cubicle, containing two, 400-ampere air-gap circuit breakers, was installed in the basement, as service equipment for the new transformer. To provide maximum speed in effecting an emergency disconnect, a push-button breaker release station was installed in the computer room.

The feeders to the computer system consist of three, 500 MCM phase conductors and one, size OO equipment grounding conductor in a three-inch conduit, from each of the two 400-ampere service breakers. Identical feeders were also installed for the air conditioning equipment, except that they are served from the main building switchboard and transformer bank. Also, one spare, empty three-inch conduit was installed for possible future expansion.

The building service is 13,200 volt primary, 208 volt secondary, network connected on both sides, transformers being located in subbasement of building.

Branch circuits were installed to serve eight computer components. Six of these have a maximum

(Continued on page 109)

Rear view of one of control panels.

Tape drive units of the computer.

Section of central power frame.

Computer console and control.

Power company to subsidize

Georgia Power executives, C. M. Wallace, Jr., vice-president in charge of sales, J. J. McDonough, president, and M. T. Reeves, manager residential sales engineering, examine the wiring promotion plan book.

Georgia Power employees are briefed on the new plan for sharing the cost of home wiring installations. Similar meetings were held over the state for contractors and others interested in home wiring.

This article should be especially helpful to the following readers:

- Electrical Contractors ✓
- Electric Utilities ✓
- Electrical Wholesalers ✓
- Electrical Inspectors ✓
- Industrial Engineers
- Consulting Engineers ✓

◆ "IT IS ESTIMATED that four out of five homes in Georgia do not have the kind of wiring needed for lights and the efficient operation of appliances," John J. McDonough, president of Georgia Power Company, said recently. To help remedy the situation, his company has set up a $4.5 million program offering cash benefits of up to $200 to homeowners installing adequate heavy-wiring facilities, plus certain major electrical appliances in their homes.

Under the three-year plan, which began January 1 of this year, the company will pay a large share of the cost of installing heavy-duty service entrance wiring in residences connected to its lines. Payments will be made to the electrical contractors doing the work, and the wiring up to and including service entrance box will then be the property of the power company.

Purpose of the new plan is to financially aid new home-builders, as well as present homeowners, in equipping their homes for "complete electrical living," now and in the future. To be equipped properly, and to qualify for the new plan, Georgia Power requires installation of four appliance circuit positions of 230 volts or more, plus service entrances of 150-amperes in larger homes (homes of more than 1,000 square feet in size). A lower 100-ampere standard is set for service entrances in smaller homes (those under 1,000 square feet in size). In either case, one circuit position must be in the range location.

In addition, certain major electrical appliances must be utilized in the home to gain the cash assistance. The total amount paid

adequate service facilities

by Georgia Power depends on the number of such appliances used, and on the individual job itself.

New homes of more than 1,000 square feet can qualify for assistance in the amount of $120 by meeting the basic requirements plus installing a separately-metered electric water heater. Smaller homes, with a 100-ampere entrance panel can qualify for $70 under the same conditions. Installation of an electric water heater to run on the regular meter draws $100 for the larger size homes, and $50 for the smaller ones. If no electric water heater is installed, but instead an electric range plus an electric dryer circuit is installed, homes of over 1,000 square feet can receive $100 in assistance, while the smaller home rate is $50. Similarly, an installation of an electric range plus 2.5-kw space heating qualifies larger homes for $100, while smaller ones can receive $50 for the same arrangement.

Existing homes eligible

Basic requirements for existing homes are the same as for new ones. Larger existing homes can qualify for $120 with the installation of a separately-metered electric water heater, while smaller homes will receive $70 under these conditions. Installation of an electric water heater to run on the regular meter rates $100 for larger homes, and $50 for smaller ones. When no electric water heater is used, installation or having in place an electric dryer circuit plus installation of an electric range or electric dryer qualifies larger homes for $100; smaller homes, $50. Similarly, installation of 2.5-kw space heating, plus installation or having in place an electric range qualifies a larger home for $100; smaller home for $50.

Homes electrically heated fall into a special category. Basic requirements include panels of 150 or larger, as required. Four or more appliance circuit positions of 230 volts are also required, plus an electric heat pump or resistance heating for all living areas.

After filling the basic requirements, electrically heated homes, new or existing, can qualify for the wiring aid plan in the amount of $200 by adding a separately-metered electric water heater and a 200-ampere service entrance panel, or for $120 for the same arrangement on a 150-ampere entrance panel. The company will pay $180 toward a 200-ampere service if a regular meter water heater, or an electric dryer circuit, is installed, or in place, in addition to the electrical heating. On an 150-ampere panel, the same alternates would qualify for $100 payment.

Apartments can qualify

Apartment houses, as well as private homes, can come under the new program. Basic requirements specify that each apartment unit panel must include three 230 volt double-pole branch circuit positions for exclusive use of 230-volt appliances. Each unit must also include an electric range circuit complete with receptacle installed and any one of the following: an installed electric range, an automatic electric water heater (40 gallon, quick-recovery, 4,500 watts minimum), or electric heating for the entire living area.

Georgia Power Company is basing its program on an estimated 22,000 new homes expected to be built in Georgia in 1960, with 73 per cent expected to qualify for the new plan. Around 1,500 newly constructed apartment houses are also expected to qualify. Of existing homes, the company estimates that about 12,000 will qualify for the program this year.

The company's new plan was adopted after study showed as too impractical the ideas of (1) company purchase and distribution of required materials, (2) company installation of required materials, and (3) company supervision of electrical contractor bids and work. The plan chosen involves the least amount of capital outlay, personnel, and office facilities for the power company.

Though wiring improvements on existing homes have been found to involve more cost than

(Continued on page 108)

Plan requirements

Basic requirements for new or existing homes:

(1) Must meet or exceed local and National Electric Code requirements.

(2) Service entrance panel must be 100-ampere capacity for smaller home (under 1,000 square feet in size). Larger homes (over 1,000 square feet in size) must have 150-ampere panel. Homes with all areas electrically heated need 150 or 200-ampere capacity panel, as required.

(3) Panel must include four 230-volt double-pole branch circuit positions for exclusive use of 230-volt appliances. One circuit position must be in range location.

Basic requirements for electrically heated homes:

Same as for new or existing homes, with additional requirement of electric heat pump or resistance heating installed for all living areas.

Additional appliance usage requirements for new homes:

(1) Separately metered electric water heater;

(2) Or an electric water heater on regular meter;

(3) Or an electric range and electric dryer circuit;

(4) Or an electric range and at least 2.5-kw space heating.

Additional appliance usage requirements for existing homes:

(1) Separately metered electric water heater;

(2) Or an electric water heater on regular meter;

(3) Or an electric dryer circuit (installed or in place) and an electric range or dryer;

(4) Or at least 2.5-kw space heating and electric range (installed or in place).

Additional appliance usage requirements for electrically heated homes, new or existing:

(1) Separately metered electric water heater (installed or in place);

(2) Or regular meter water heater;

(3) Or an electric dryer circuit (installed or in place).

Basic requirements for apartments:

(1) Must meet or exceed local and National Electric Code requirements.

(2) Feeder circuit of 100-ampere minimum installed for each apartment unit.

(3) Three 230-volt double-pole branch circuit positions for exclusive use of 230-volt appliances for each apartment unit.

(4) An electric range circuit complete with receptacle installed.

Novel leasing system sells footcandles not fixtures

By Harry J. Miller

This article should be especially helpful to the following readers:

- Electrical Contractors ✓
- Electric Utilities ✓
- Electrical Wholesalers ✓
- Electrical Inspectors
- Industrial Engineers
- Consulting Engineers ✓

◆ "SELL THE SIZZLE — not the steak!" is the axiom made famous by America's super-salesman Elmer Wheeler.

In similar fashion Tampa's Fluorescent Service Corporation offers customers in the Tampa, St. Petersburg, Clearwater triangle, a service-sales contract on lighting installations unique in electrical contracting circles; one predicted on the idea of selling footcandle illumination and not lighting systems.

Says the Tampa firm's president, Malger H. Gray: "We take over the lighting installation at the point where the architect left off. We lay out a lighting system custom-tailored to the customer's needs; then we pick up the tab for the fixtures, lamps, and installation from the electrical contractor, then lease the system back to the tenant or owner on a 5-year contract including maintenance.

Malger H. Gray (left), president of Tampa's Fluorescent Service Corporation, examines plans for another commercial lighting fixture installation which he will finance and lease back to the business establishment. This system which he has pioneered has proved to be an effective means of expanding his lighting maintenance service on a profitable basis.

Sell the lighting level

"Our aim isn't to sell fixtures, but a guaranteed lighting level that will produce the proper illumination throughout the life of the contract."

Gray and his partner, W. Ed Davis, have for the past 12 years maintained lighting systems in commercial, industrial, and institutional establishments on Florida's West coast. The new venture is a logical outgrowth of this maintenance service which is performed on a contract basis under contracts varying from $3 to $900 a month.

By reason of their long experience in lighting maintenance, the partners are eminently qualified to judge the constituents of a proper selection of fixtures and circuitry for each of its lease-sell contracts. They are adamant in their belief that fixtures should be purchased not on the basis of first cost, but on a proper evaluation of their efficiency and merit for the job of lighting they are to do.

"Our service keeps the customer from being at the mercy of an un-

learned designer of his lighting installation," says Gray.

Since suppliers have competent lighting experts willing to render service to contractors, Gray consults with them as to the type of fixtures needed, their quality, footcandle output, and layout, needed for the particular job. The electrical contractor doing the job is solicited for a bid on the fixtures and installation. Unless the contractor's bid is unrealistic, Gray seeks no further bids, and makes arrangements to pay the contractor on a satisfactory basis.

Throughout the job, a constant vigil is maintained to insure that the job goes in as Gray planned it. The specifications are written: "And No Equal".

Following completion of the job, it is "sold" to the customer, with Fluorescent doing the necessary financing.

"We're just as selective in our choice of contracts and customers as is the bank that loans us the money," said Gray. "Sure, about 50 per cent of the money in every installation is our own, but then we have added another regular customer for our bread-and-butter lighting maintenance service.

"By shying away from the wiring of the jobs, we keep our original maintenance operations simpler and more efficient. Thus we're able to better fix our costs to the point where we can buy the job on a bid basis from the electrical contractor.

"In the remodeling of an existing building, we may do the entire installation, or we'll follow up a new job, but we refrain from moving in on any contractor or trying to chisel him out of his job.

"Anyway, the contractor could probably do the job cheaper than we could even though we're contractors ourselves, simply because he's on the job already and ahead of us. All we solicit is a bid on the fixtures and installation," explains Gray.

How this works out is cited in one instance where the electrical contractor on the job had made a fixture allowance of $1,500 to his general contractor. The job required better than 50 footcandles, and, in some areas, better than 75 footcandles.

"We figured out," said Gray," that under the best of circumstances, $1,500 could provide no more than 25 footcandles.

"To assure an installation supplying adequate illumination would cost $6,000; at least $3,800 at wholesale. The electrical contractor knew there would have to be a showdown prior to job's end, because the particular architect of the building was unqualified to lay out the lighting and its inadequacy was evident in the planning stage."

By stepping into the picture to finance the deal on a lease-sale basis, Gray upgraded the job, the customer got a better installation, and the contractor made a better profit.

Relief for customer

Another aspect of Gray's venture is that the unlearned customer is relieved of the onerous task of proper fixture selection, and he runs less risk of succumbing to the blanishments of a high pressure fixture salesman under whose suasion the customer may buy on price and get short-circuited on quality.

Thus Fluorescent Service stands in the same relationship to its customers as an architect to his client.

"Lease-selling is of the utmost importance where a sizable job is concerned," says Gray, "and the cost at which we sell a deal gives the customer a saving in his tax structure, since if he leases the system, it can be charged off as an operating expense." After expiration of the 5-year contract term, only cost is the maintenance service provided by Gray's firm.

During the 5 years, maintenance is part of the lease and this, being lumped into the monthly payments, is also operating expense and deductible.

Reason for his selection of a 5-year contract term is explained by Gray: "It's a sizable investment on a big job. Say we've got $5,000 tied up in it. The customer pays 6 per cent interest, plus fire insurance. Then there are 60 equal monthly payments, plus 6 per cent, plus the maintenance charge. This is all lumped together into each single payment."

Obviously, some contractors may not have the financial resources or credit to swing a big fixture installation.

"So long as the contract is with a reliable firm, we can borrow money on it from the bank to pay the contractor, which means our own capital investment is limited to the direct labor and material cost."

"We work along with the contractor, and we don't compete with him for the lighting, and this makes for better relations with our fellow-contractors," said Gray. And this would seem encouragement to contractors who previously shied away from big-ticket jobs by reason of their limited credit or finances. Only where the job is a small one and there is no contractor on it, does the Gary firm handle the entire installation and financing.

Granted that the initial cost of modern wiring and fixtures may be a sizeable item in the building budget, few will dispute that the dividends resulting from increased efficiency through well-planned lighting will eventually offset the size of the investment. That's Gray's selling pitch, plus the fact that both amortization and maintenance is low.

Tax-wise, lease payments, as noted before, are operating expense and deductible, whereas the cash outlay for a lighting system must be depreciated as a capital expense. Thus Gray's lease arrangement offers a painless way to increase the customer's assets.

Basically, equipment leasing has increased as a result of the steadily-mounting cost of capital equipment. Leasing has historically been a means of permitting businessmen to function without owning everything they need to do business, since profits are made by *using* capital equipment rather than by *owning* it.

More light, less risk

Gray has found his plan the open Sesame to a lucrative business because he makes his sales pitch around the ideas that the customer can get the lighting system he needs, without a major capital outlay for it, and he reduces the risk of loss caused by possible obsolescence of lighting equipments.

"After expiration of the contract at 5 years, especially in a downtown store, it'll be time for a remodeling anyhow," says Gray, "and also time for another lease-sale deal for a more modern lighting system."

Leasing is not a method of tax avoidance; its primary value lies in the way it frees working capital for other uses. Since leasing charges are legitimately deductible as business expenses, they reduce taxable income *now*.

In the zooming business and industrial areas where Flourescent Service operates, lease-sale contracts already in effect point the way to an expanded profit opportunity for this pioneering contracting firm.

Questions and answers on the Code

◆ Discussion of the National Electrical Code and its practical application to problems that confront electrical contractors and electrical inspectors from day to day is a special feature of the annual meetings of the Southern Section, International Association of Electrical Inspectors.

Interest in this portion of the recent Southern Section meeting held in Jackson, Miss., was greater than usual because of the new 1959 edition of the Code which became effective just a short time before the meeting. Here is a selection of questions and answers that formed part of this year's Code discussion.

Section 210-6(a). An industrial "readily accessible" as defined in Article 100 have any application in determining when a roof may be "readily walked upon"? What common rule may be used in this determination?

Answer: The roof does not have to be readily accessible, whether it can be readily walked upon is to be determined after reaching the roof. The code does not state any degree of roof pitch, individual judgement should be used.

Section 516-2(b). Is there any limitation to the height of the Class I Division II area within the 20 feet horizontal radius of a spray booth?

Answer: The ceiling is the vertical limit.

Section 310-6. What depth does the Code require type UF cable to be buried when supplying a yard light on residential property?

Answer: No specific depth is required when conforming to other requirements of this Section.

Section 200-2. Does the Code require the neutral conductor at the weather head to be identified?

Answer: No, in accordance with an official interpretation.

Section 310-6. Is type MI cable approved for direct burial in the ground?

Answer: Yes. See Sections 310-5 and 330-2.

Article 500. Would the footnote of Section 725-1 exempt Article 500 from applying to an installation of a gasoline driven generator in a hospital having a fuel tank located outside the building a distance of 65 feet with a fuel pump near the tank which obtains its supply at 6 volts from the ignition system of the gasoline engine?

Answer: Section 725-2 would apply and require conformity with Articles 500-517 inclusive.

Sections 250-25, 250-57(b)1. Is the grounding conductor (when insulated) for systems or service equipment required to be identified; if so what color?

Answer: No.

Article 300. Is it permissible to use a copper neutral conductor and aluminum phase conductors in the same raceway?

Answer: Yes, if phase conductors are insulated and properly terminated with approved terminations.

Section 310-10. Is it permissible to use type SE cables in multiple, when conforming to size mentioned in this section, and would it apply for services?

Answer: Yes, when they also conform to other requirements.

Chapters 2-3. How would you properly install tree lighting, as used for decorative or landscape lighting, supplied underground from a building to trees varying from 20 to 60 feet in height?

Answer: Install in accordance with Article 730 and the general requirements of Chapters 2-3.

Section 210-6(a). An industrial plant with a 440-volt delta service desires to use mercury-vapor fixtures having 440-volt ballasts. Would this be a violation of the Code?

Answer: Yes. Not recognized if voltage to ground exceeds 300.

Chapter 9. Why were Tables 1-9 not incorporated in Article 310 with other Tables?

Answer: Those remaining in Chapter 9 have applications also under other Articles.

Section 250-23. Does this section requirement mean that the grounding conductor shall be attached to the service switch box or does the phrase "supply side" include the meter trough or even at the service head?

Answer: Any point on the supply side of the service disconnecting means, as indicated in Sections 250-52 and 250-61.

Section 90-2(a-b), 230-23, 230-5. Where service drop cable is routed across private property which serves the premises, does the Code or utility company have jurisdiction.

Answer: The Code applies and requirements of Article 230 are applicable.

Section 210-7. Is it the intent to require the grounding contact of the grounding receptacle specified in Sections 210-12(b) and 250-59 to be grounded in accordance with Section 210-7?

Answer: On existing installations the grounding conductor may be a separate conductor connected to the nearest water pipe of a metallic water piping system. On new installations it shall be connected to the system ground. Also Section 250-112 shall apply and take precedence.

Section 230-44. Is it the intent that electrical metallic tubing may be used as a raceway for service entrance conductors?

Answer: Yes.

Section 230-44. May interlocked armored cable be used for service entrance conductors?

Answer: Yes, when specifically approved for the purpose.

Section 710-32. Does the term "circuit conductors" mean any and all conductors of systems supplied at voltages exceeding 600 and also service entrance conductors?

Answer: Applicable to all.

Section 710-32. May busways be used for the purposes or wiring method covered by this section?

Answer: May be, if approved for the voltage involved. At the present, Underwriters Laboratories limits its services to 600 volts.

Section 710-32. Would the term "buses" include busways?

Answer: Not very definitely, probably not; originally intended to apply to a type of field con-

struction; should not be construed as including busways in absence of specific reference.

Section 310-2(a). Type RH conductors are limited in use to "Dry Locations" and type AVA to "Dry Locations, Only". What is the significance in the difference of the terms?

Answer: Type AVA may be used where no moisture is present, type RH may be used in damp locations.

Section 210-22(b). In the first line of the last paragraph the word "outlet" is used; why was it substituted for receptacle?

Answer: In error, the word receptacle was intended.

Section 210-22(b). Section 2124 (b) of the 1956 Code required at least one receptacle for connection of laundry appliances. Why was this omitted in the 1959 edition?

Answer: Many dwelling occupancies do not use laundry appliances. This Section shall be construed to require a grounding type of receptacle in occupancies that will use laundry appliances.

Section 310-11, (Note 11). Would derating of the phase conductors be required when a 200 ampere, three-phase four wire is installed, with all but 20 amperes used for three-phase power, the 20 amperes representing single-phase lighting load?

Answer: No.

Section 230-41. What size neutral conductor would be required for the above?

Answer: Section 230-41 exception 3 could apply if load requirement is met and a No. 8 wire could be used. Also exception No. 4 could apply, depending on the conditions mentioned, in which case the wire could be No. 12. Clarification between this Section and Section 250-51 is desirable.

Section 250-94. This section would require a 1/0 system grounding conductor for a service consisting of three 450 MCM and a No. 8, which is large enough for the load of 20 amperes connected to the No. 8 neutral. Would this conform to the code?

Answer: It would meet requirements, however clarification or correlation is necessary in relation to Section 230-41 and 250-51.

Section 230-70(b), 230-91. In residential wiring, how far can service entrance conductors be run before installation of overcurrent protective devices must be connected?

Answer: At the nearest readily accessible point to the entrance of the conductors, either inside or outside the building walls.

Section 230-24(a), 730-19. A roof has a pitch of 2 inches in 12 feet; could it be considered as one that may be readily walked upon?

Answer: Yes.

Section 410-74. Is there a fluorescent fixture approved for mounting in direct contact with combustible low-density cellulose fiberboard ceilings?

Answer: No. 1½ inches of separation is required. To determine density, the material may be weighed and measured to obtain cubic content to conform to Note 3 in this Section.

Section 410-71, 410-78. In order to prevent unnecessary interruptions would it not be satisfactory to protect all ballasts of fluorescent fixtures at 3 amperes?

Answer: Perhaps; rating depends on ambient and temperatures generated by the equipment.

Article 215, 220. When a number of branch circuits of 20 ampere capacity are installed for air conditioners (load unknown when wiring is installed), what load value should be used in the calculation of capacity for feeders and/or service entrance conductors.

Answer: 80% of the branch circuit capacity, one or more, plus 25% of one branch circuit capacity, or 20 amperes for one branch circuit plus 16 for each other branch circuit installed for that purpose.

Section 210-7. A circuit is taken from a junction box on the outside wall of a dwelling, thence in a two-conductor direct burial cable to an outlet with a receptacle on the lawn some distance away. At each end of this run, conduit is used for mechanical protection for a distance of about 3 feet into the earth. The receptacle used is an approved grounding type. Is this installation properly grounded; if not, what should be done to correct it?

Answer: No. If this is a new installation the cable should contain a grounding conductor to which the grounding contacts of the receptacle is connected, and also the boxes at both ends should be bonded to the grounding conductor.

Section 250-42. Can I as an inspector require an equipment grounding conductor to be run with the direct burial cable to ground a yard light mounted on a metal pole?

Answer: Yes. See Section 250-42(c and d).

Section 220-7. A single family dwelling supplied at 115/230 volts has a computed load of 17.6 amperes for lighting and small appliances, the owner decides to install branch circuits for a future range, dryer, and air conditioners. How many additional amperes would it be necessary to provide for in the service entrance conductors?

Answer: Where at any time it is found that feeder conductors are, *or will be*, overloaded, Section 215-2, last paragraph, would require the capacity to be increased for the actual load served. Therefore in the absence of specific ratings or loads for the appliances to be anticipated, the examples Nos. 1, 1(a), 1(b), 1(c) could be used in computations for the requested information.

Section 430-32(b). Would this Section require overload protection for a U.L. listed, wall mounted (fixed) fan unit having a motor rated at 1/10 hp, supplied by a 15 ampere branch circuit, and controlled by a switch within sight of the motor?

Answer: Yes. Assuming "fixed" to mean permanently installed, then the last paragraph of the quoted section would require overcurrent protection by one of the means provided in Section 430-32(c).

Section 300-12, 300-13. Is it the intent of these sections to eliminate splices in tee or ell conduit fittings?

Answer: They are not considered as outlet or junction boxes.

Section 250-94(a). Is the grounding conductor intended to be calculated on the basis of size or capacity of conductors connected in multiple and would the same method be used for aluminum conductors?

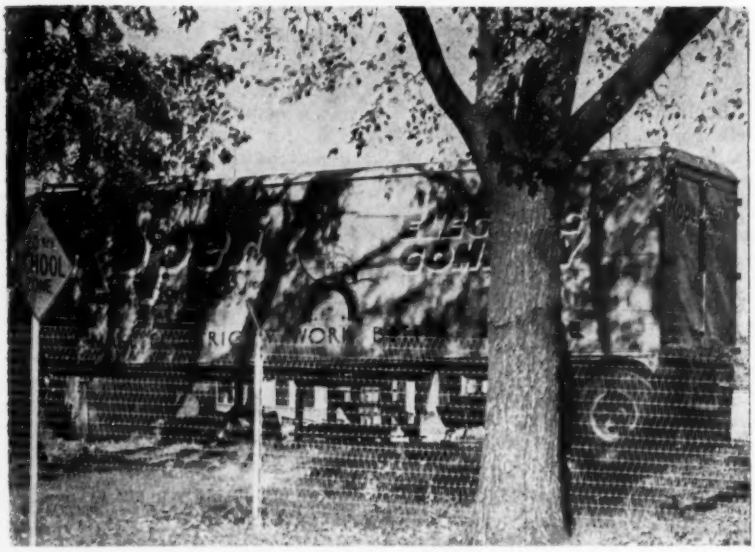
Answer: It shall be based on the combined circular mil area of the conductors in multiple. The same method should be used for aluminum conductors.

Section 410-74. Is cork tile (the type often used on floors) considered as low density cellulose fiberboard?

Answer Yes.

Section 210-20. What Section of the Code covers the maximum protection required for a 9 ampere water heater, supplied by an individual branch circuit of No. 10

(Continued on page 108)



Roper Electric Company's electrically lighted and heated trailer is designed for big jobs. At night, it becomes a lighted billboard.

A convenient on-the-job office is built into the end of the trailer.

Time saving tools and methods

By L. H. Houck

This article should be especially helpful to the following readers:

Electrical Contractors ✔
Electric Utilities
Electrical Wholesalers ✔
Electrical Inspectors
Industrial Engineers ✔
Consulting Engineers

◆ EFFICIENCY in keeping track of company tools has been hailed as a key factor in the 40-year success story of a Missouri electric company.

With more than $30,000 worth of company-owned tools now on hand, Roper Electric Co., Springfield, Mo., has shown by proved methods that supplying workmen with expensive tools can be simple and profitable. Problems of keeping company-owned tools separate from those the workmen own, of paying for lost tools, and of making tools "pay off" have evidently been resolved by the Roper firm.

Roper Electric knows at any hour, how many tools it has on a job, as well as the monetary value of these tools. This information is in a loose-leaf tool inventory book, in use almost every day.

Each tool bought by Roper Electric is etched with the company name. The tool brand name, specifications, and original cost are then listed in the tool inventory. This information is also forwarded to an insurance company, which carries $25 deductible insurance on the entire inventory of Roper tools. Any tool loss greater than $25 is paid immediately by the insurance company. Payments are based on original cost, and no depreciation is charged against the tools.

The method used to keep track of tools is simple and efficient. Tools are kept in the supplies warehouse, specially the smaller tools, and here a full-time custodian checks tools and supplies in and out from a small office.

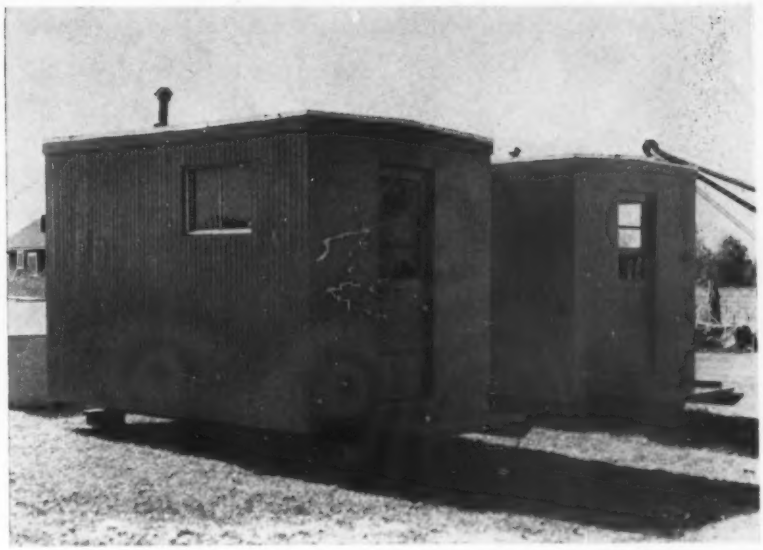
Workmen charge-out tools

Tools are charged against a job in the same manner as the materials. When the job has been completed then tools and excess materials are charged back in. If there is any difference in the tools checked out and those checked in, then that represents the tools lost. Since only company-owned tools are charged against a job, and the crew is only responsible for checking those back in, an individual workman could have ever so many tools of his own. However, because Roper supplies tools of every description, each workman has only his "pet" tools.

How this works out in practice is well illustrated by the record on a $125,000 job at the Missouri School of Mines, Rolla, Mo. More than $2,000 worth of tools was charged against this job which was recently completed. The tool record and the inventory book shows all the tools were returned except one small threading collar for one of the threading machines. This small, inexpensive item was considered lost and written off.

Part of the credit for keeping tool losses near the zero mark must be given to the Roper method of job security, which is simple but effective. On most medium sized jobs and small jobs, one or more large tool boxes, called "gang boxes", are used. These boxes vary in size, but are equipped with padlocks and are of secure wood and metal construction so that illegal entry would be

Trucks can easily reach this tool crib because of the overhead door.



Portable tool houses with heat and lights provide a locked storage place for tools on the job, plus a drawing table for handling plans.

prove effective

difficult and would attract attention.

On larger jobs tool sheds are used. These 8 x 12 foot sheds, as well as the gang boxes, become repositories for wire and supplies, as well as tools.

Locked protection anywhere

Both tool sheds and gang boxes are painted the Roper orange colors. The sheds are equipped with supply bins, desk, heat and anything else that might be needed. Mounted on large wooden skids, they can be loaded on a large truck with cable and winch, and spotted on the job with the same vehicle. When the job is completed the tool shed is brought in, contents invoiced and checked against the out records, and the job closed.

On large jobs, Roper uses a 35-ft. over-the-road trailer, equipped with material bins, power tools, and a complete electrically heated office with fluorescent lighting in the nose. Here the Roper foreman can check his blueprints and take care of his office business in efficient comfort. At night the trailer is lighted to become a lighted billboard, with lights controlled by an electric time clock.

Modern tools figure prominently in Roper's estimating methods, since the policy on tools is to buy all the modern tools they need. They never rent. They own several sets of reel jacks, for instance, for handling spools of large diameter wire, items not often found in contractor's shops.

Roper's shop is the only one in Springfield which employs full-time, a graduate electrical engineer. Frank N. Pomeroy, Roper's engineer, does much of the estimating on new jobs. When preparing to bid for a job, he takes into consideration some of the more important tools which would be used on such a job. For instance, if there should be a large number of punched holes required in steel, he knows Roper has a "one shot" hydraulic punch with assorted dies that will cut holes up to 4 inches in diameter at "one shot," as compared with the usual method of drilling a pilot hole and then making two or three cuts.

Numerous tools available

He also knows that the tool inventory shows 22 different power

Owner M. O. Roper shows one of his company-owned special tools.

Roper truck has rounded-off bed for moving portable tool houses.

O. M. Roper (left) and his son, Phillip, check the loose-leaf tool inventory book, which currently shows a stock of $30,584.89 worth of tools owned by the company. As new tools are added to the list, the insurance company is promptly notified with the name and cost.

threading machines, plus two power steel cutting bandsaws. Another unusual item which he might use to advantage is a Nelson stud welder, a machine seldom found in ordinary shops. This machine welds a threaded or other type stud to steel frame, plate, or other steel members with a speed faster than that of nailing into wood. Having this equipment in the toolroom ready for use could be an important factor in figuring job cost.

Take the big reel jacks. Because of the lack of equipment for efficient handling of reels with high capacity wire, many contractors buy this wire from supply houses cut to lengths. Supply houses make charges for this service, and sometimes it delays early delivery. Roper takes the wire on a reel, using his own jacks to reel out the lengths wanted with no extra fees or extra manpower needed.

Another item shows the extent to which Roper goes to keep ahead with modern tools. This is an electric saw using a small circular saw for cutting rectangles in walls. While the reciprocating saw used for this purpose is also listed in the inventory in half dozen lots, this circular saw tool is one of the fastest methods known for cutting walls, whether they are plaster, steel or wood.

O. M. Roper, in the electrical contracting business for a half century and head of the company which bears his name, offers this comment on tools:

"Good tools and plenty of them pay the biggest dividends in the competitive contracting business. Tools keep the alert contractor in a more competitive position. Labor turnover, which can be a problem, is less when the company furnishes an abundance of power and labor saving tools. We buy every tool we think we will need —before we need it."

The Roper company owns its own tubular steel demountable scaffolding, with enough in stock to handle large jobs. Some of the other unusual tools owned by Roper include a power operated cable puller with more than 700 feet of wire pulling cable on the winch. And again, when they are on a job without lighting, they have a portable 3 kw gasoline-powered light plant.

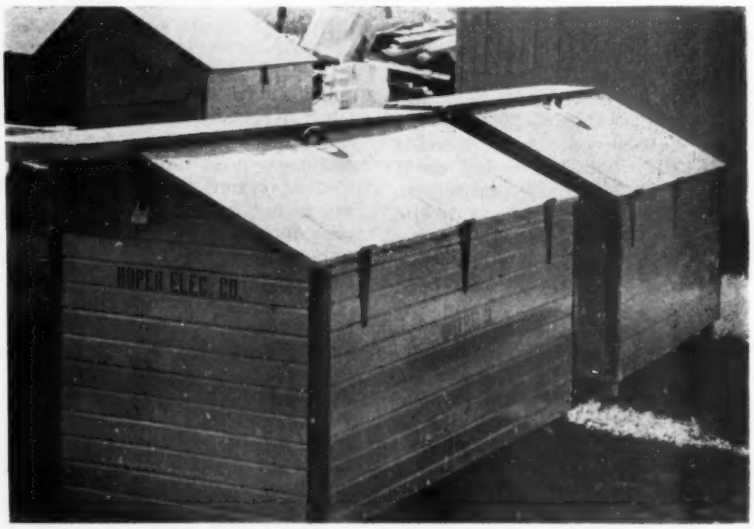
Men work in comfort

There is a stock of portable electric heaters for use by Roper electricians when working in unheated buildings in cold weather. Roper emphasizes comfort for its men.

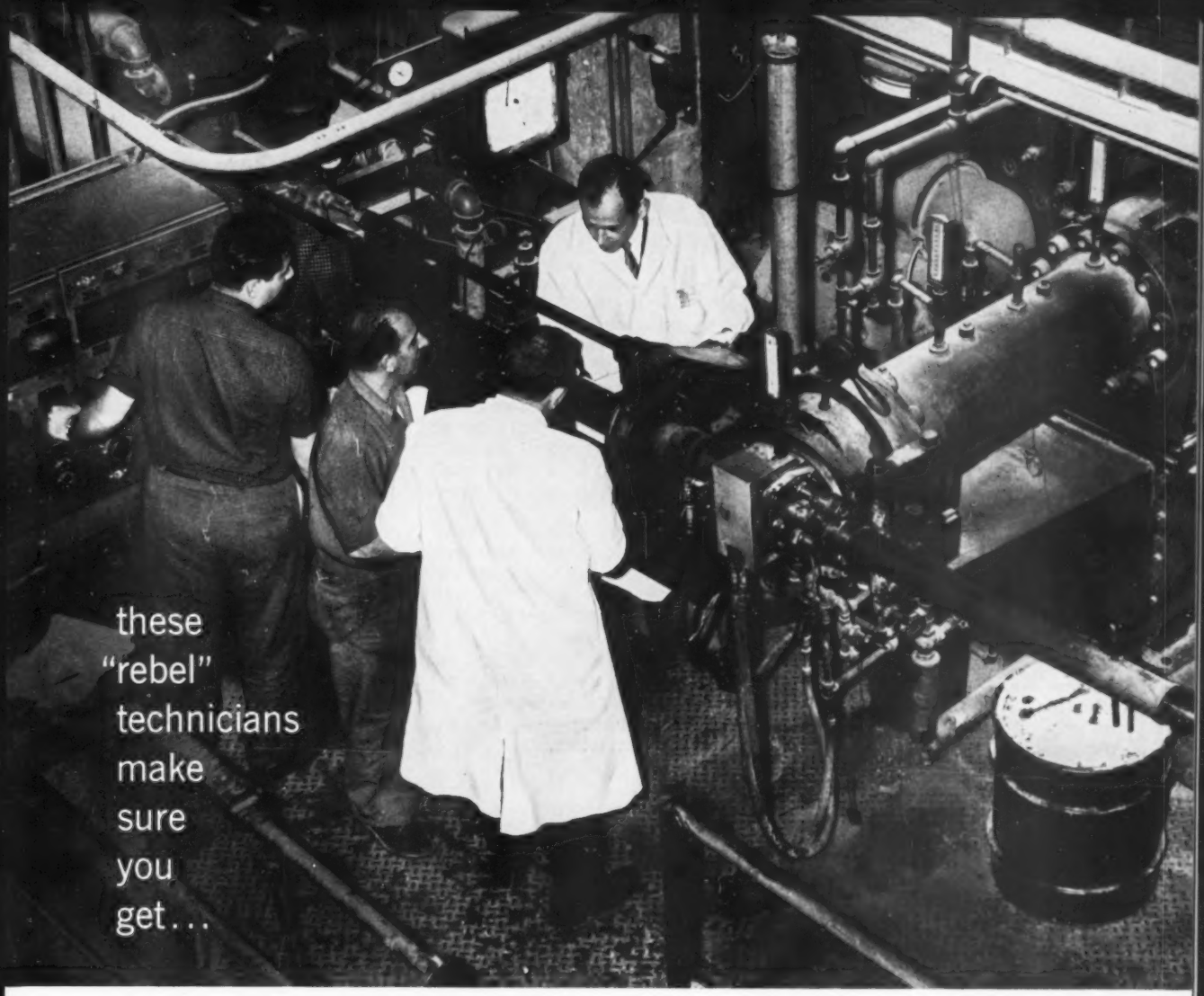
Roper received the contract for an $80,000 wiring job for the Breech School of Business Administration building at Drury College. This college is the alma mater of Ernest Breech, executive vice-president of the Ford Motor Company, who donated a million or so to found this school.

O. M. Roper is an antique car collector, having collected and restored two Model T Fords, one a 1916 with brass radiator and the other a gleaming 1923 model. Both are in tip-top running shape and Roper drives them in local parades. When the dedication ceremonies were held to dedicate the Breech building, Ernest Breech was there from Detroit and Mr. Roper was there in his 1916 Model T. The upshot was that he and the Model T and Breech were photographed

(Continued on page 108)



Gang boxes such as these are used on jobs which do not require the larger trailer or the tool house. Gang foremen check tools in.



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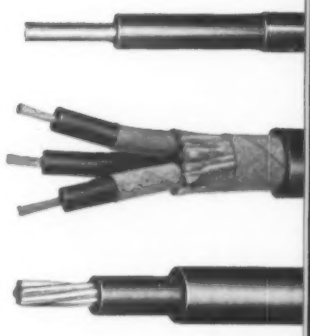
Such close cooperation between laboratory and quality control personnel is unusual in the wire and cable field. It is another reason, however, why Circle products have grown to enjoy their reputation for high quality.

Next time you buy or specify cable, we suggest you ask for Circle. There's no finer cable made.



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Dallas eliminates temporary power hazards

By John A. Kissh

Manufacturers' Representative
Dallas, Texas

This article should be especially helpful to the following readers:
- Electrical Contractors ✓
- Electric Utilities ✓
- Electrical Wholesalers ✓
- Electrical Inspectors ✓
- Industrial Engineers
- Consulting Engineers

◆ Temporary electrical service has always been just that . . . temporary and neglected . . . until this past year in Dallas, where an attempt was made to improve the situation, via an order issued to set up definite standards for temporary service poles.

In a letter issued to all electrical contractors in the Dallas area a few months ago, M. D. Darrah, chief electrical inspector for the City Building Department, took steps to stop the use of hazardous temporary service poles. The letter outlined new requirements for a type of pole that would be approved in advance of need, and included a diagram of the type pole approved.

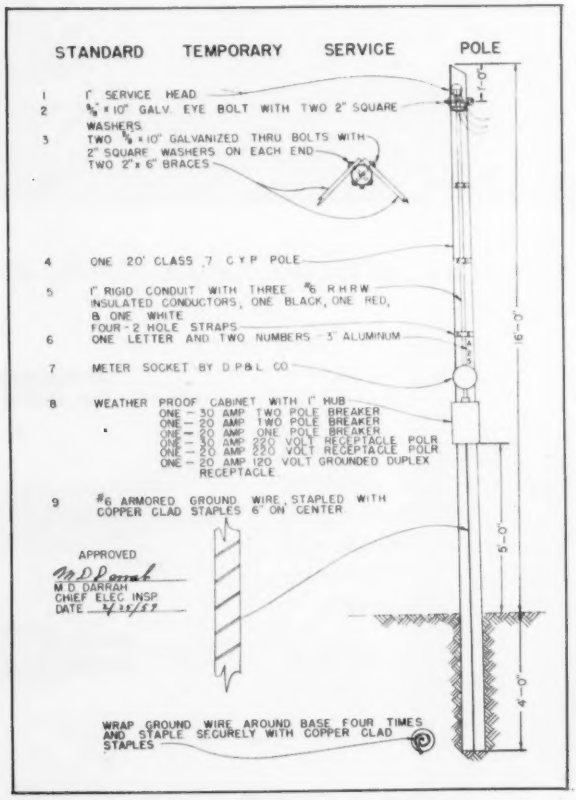
Requirements said the new pole assembly was to be standard, and was to include a weatherproof power outlet with one-inch hub and first-line circuit breakers and receptacles.

Mr. Darrah also set up a pole inspection plan designed to save money and time on the part of city electrical inspectors as well as individual contractors.

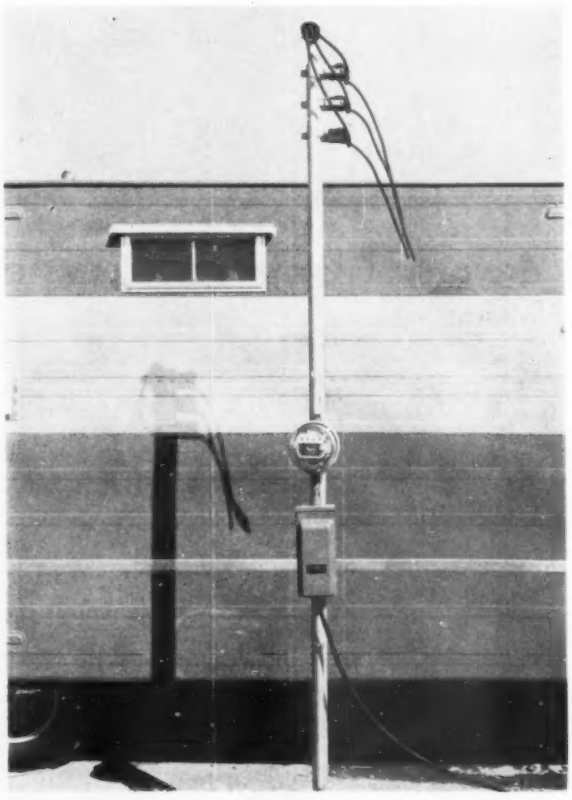
Under the new set-up, if a contractor used the recommended type of temporary service pole and its assembly, together with the recommended receptacles and power outlets, the pole could be assigned a permanent number, and then could be used continuously from job to job, without further inspection. This saves time for the contractor, who receives an immediate power tie-up, and also saves inspection costs, which formerly ran about $3.50 per inspection. (The city of Dallas had been averaging over 4,000 inspections of temporary service poles per year.)

Issuance of the ordinance came because of the danger of power poles and circuits which often were open-faced and uncovered. With

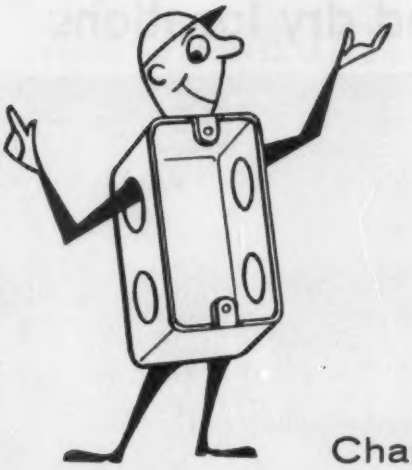
(Continued on page 107)

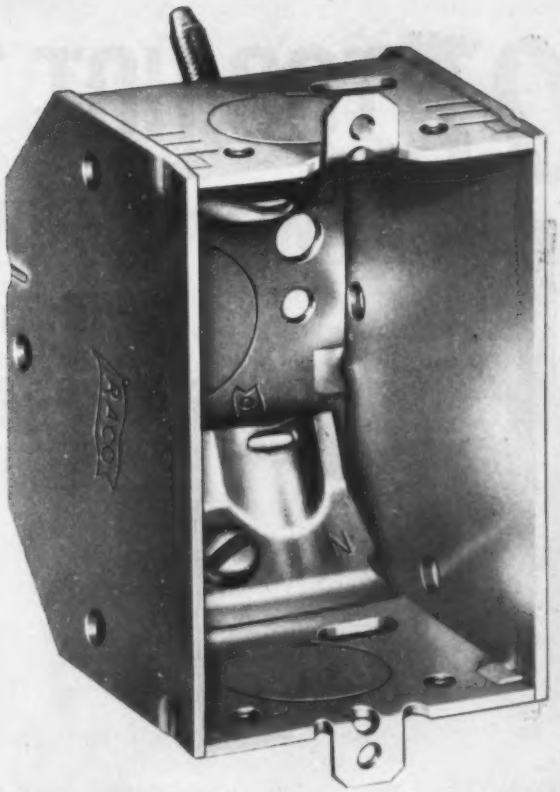

STANDARD TEMPORARY SERVICE POLE
1 1" SERVICE HEAD
2 ⅝" x 10" GALV. EYE BOLT WITH TWO 2" SQUARE WASHERS
3 TWO ⅝" x 10" GALVANIZED THRU BOLTS WITH 2" SQUARE WASHERS ON EACH END TWO 2" x 6" BRACES
4 ONE 20' CLASS 7 C.Y.P. POLE
5 1" RIGID CONDUIT WITH THREE #6 R.H.R.W. INSULATED CONDUCTORS, ONE BLACK, ONE RED, & ONE WHITE FOUR-2 HOLE STRAPS
6 ONE LETTER AND TWO NUMBERS 3" ALUMINUM
7 METER SOCKET BY D.P.&L. CO.
8 WEATHER PROOF CABINET WITH 1" HUB
ONE - 30 AMP. TWO POLE BREAKER
ONE - 20 AMP. TWO POLE BREAKER
ONE - 20 AMP. ONE POLE BREAKER
ONE - 30 AMP. 220 VOLT RECEPTACLE POLR
ONE - 20 AMP. 220 VOLT RECEPTACLE POLR
ONE - 20 AMP. 120 VOLT GROUNDED DUPLEX RECEPTACLE
9 #6 ARMORED GROUND WIRE, STAPLED WITH COPPER CLAD STAPLES 6" ON CENTER
APPROVED
M.D. DARRAH
CHIEF ELEC. INSP.
DATE 2/28/59
WRAP GROUND WIRE AROUND BASE FOUR TIMES AND STAPLE SECURELY WITH COPPER CLAD STAPLES
1'-0"
16'-0"
5'-0"
4'-0"

The diagram above shows the new requirements set up for temporary service poles in Dallas.



This pole features a weatherproof service cabinet made by Midwest Electric Products, Inc.





Charlie RACO Says...

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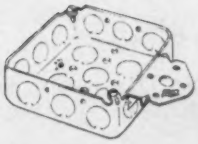
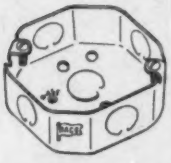


RACO's complete line of brackets gives you just the right bracket for any job. All RACO brackets are projection welded for added strength... rigidity.



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*T.M.

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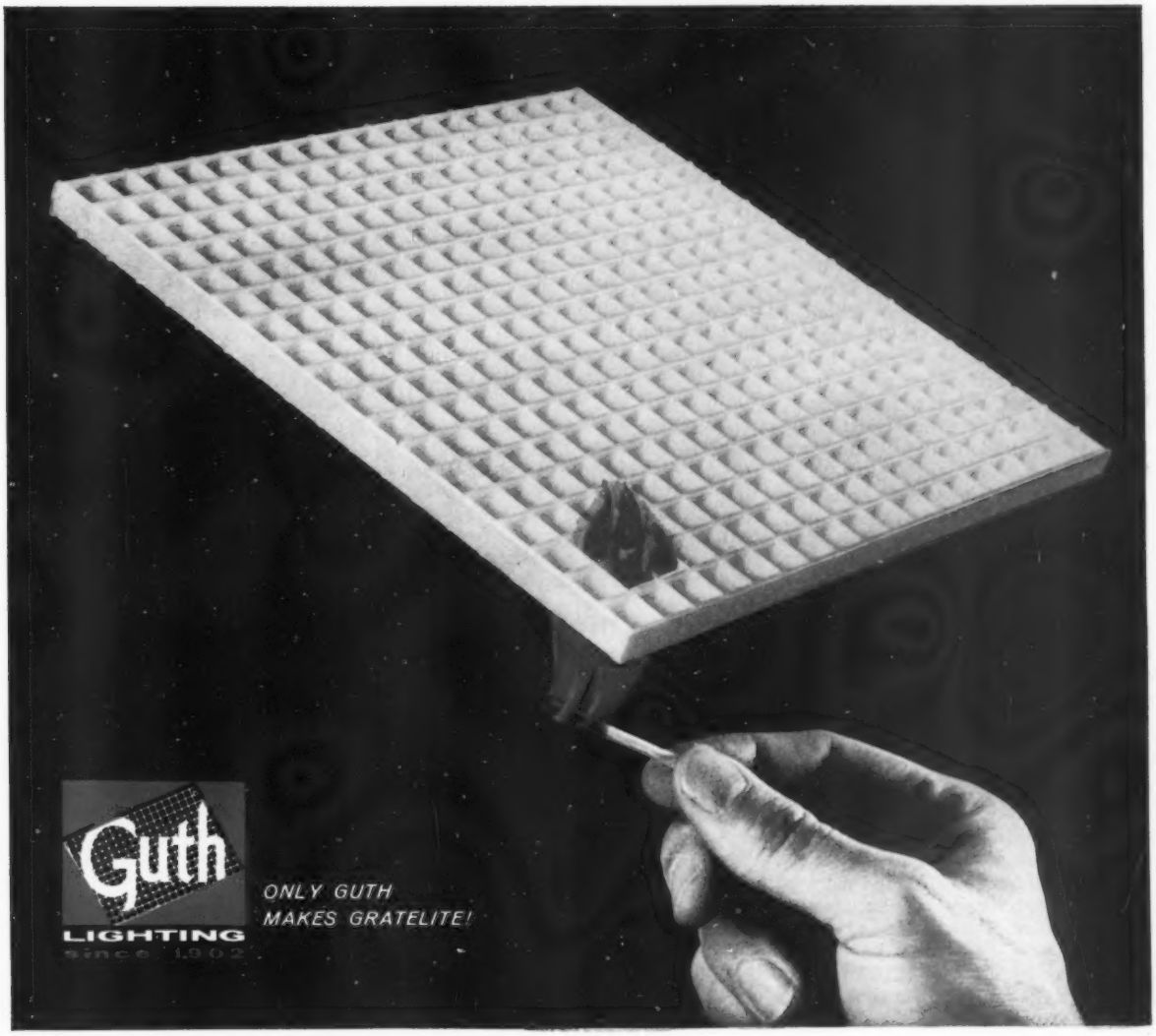

Understanding the Code

By Walter R. Stone

This article should be especially helpful to the following readers:

- Electrical Contractors
- Electric Utilities
- Electrical Wholesalers
- Electrical Inspectors
- Industrial Engineers
- Consulting Engineers

◆ IN THIS ISSUE we will conclude our analysis of the new Code changes.

Section 430-32 (a-1 and c-1) permits continuous duty sealed hermetic-type refrigeration compressor motors to have motor running overcurrent protective devices rated at not more than 125 per cent of the motor full-load current.

This was limited to 115 per cent in the 1956 Code and raised to 125 per cent for motors not exceeding 160 amperes by Interim Amendment No. 104. The new Code has removed the limitation imposed by the interim amendment and now permits 125 per cent for all motor sizes of this type, which is the same as that permitted for other continuous duty motors with a temperature rise not exceeding 40 C.

Section 430-34, which permits a higher rating overcurrent device for motor running protection when the next standard size or setting exceeds the 125 per cent, now permits up to 140 per cent instead of the 130 per cent imposed by the 1956 Code and the 130 per cent for motors of over 160 amperes imposed by Interim Amendment No. 104.

In nearly every case, however, the required 125 per cent protection can be provided. With the wide range of ratings or settings now available, contractors have no difficulty staying within this maximum, and inspectors usually insist upon it.

Section 430-39 includes Interim Amendment No. 106 which stated, "When a non-automatic motor controller serves as the running overcurrent device, it is recommended that all ungrounded conductors be opened." This is now the last sentence of Section

(Continued on page 46)

Code test questions

1. The term "overload," when applied to electrical apparatus, refers to an operating current which, if allowed to persist, could cause damage to the apparatus and dangerous overheating; but the term does not refer to excessive currents resulting from short-circuits or ground faults. True or false?

2. The provisions for motor overload protection specified in Article 430 for motors is not intended to apply to motors driving fire pumps. True or false?

3. On a-c circuits, a general-use a-c snap switch may be used to control a small motor having a full-load current rating not exceeding the ampere rating of the switch. True or false?

4. The motor controller for a sealed hermetic-type refrigeration compressor motor shall have both a continuous duty full-load current rating and a locked-rotor current rating not less than the nameplate full-load current and locked-rotor current respectively of the compressor motor. True or false?

5. Threaded EMT may be used as the wiring method in Class I, Division 2, locations. True or false?

6. Where Type MI cable is used as the wiring method in Class I, Division 1, locations:

(a) seals are not required, since vapors or flames cannot travel through the cable.

(b) seals are prohibited to prevent contact between the exposed conductors and any compound which may not have suitable insulating qualities.

(c) the passage of gasses and flames is inherently prevented by the construction of the cable, but sealing compound is necessary in cable termination fittings to exclude moisture and fluids from the insulation.

Which is correct? a? b? or c?

7. Motors installed in Class I, Division 2, locations:

(a) may be nonexplosion-proof enclosed or open type if without brushes, sliding contacts, switching mechanisms, or arcing devices.

(b) may be nonexplosion-proof with sliding contacts and switching mechanisms.

(c) are required to be explosion-proof whether or not brushes, sliding contacts, switching mechanisms, or arcing devices are used.

Which is correct? a? b? or c?

8. Lamps and lampholders which are not installed at least 12 feet above the floor in commercial garages shall be totally enclosed or provided with guards or screens if located:

(a) over lanes through which vehicles are commonly driven.

(b) in any area directly over the garage floor, including walkways and work bench areas.

(c) in stock room storage areas.

Which is correct? a? b? or c?

9. The ungrounded circuits supplying hospital operating areas where flammable anesthetics are administered are required to be provided with visual and audible alarm signals which shall be energized when any conductor becomes grounded through a resistance or capacitive reactance of any value up to:

(a) 10,000 ohms.
(b) 60,000 ohms.
(c) 100,000 ohms.

Which is correct? a? b? or c?

10. In places of public assembly, the wiring method shall be metal raceways or Type MI cable where the place of assembly has a capacity of:

(a) 25 or more persons.
(b) 100 or more persons.
(c) 200 or more persons.

Which is correct? a? b? or c?

Correct answers will be found at end of article on page 107.

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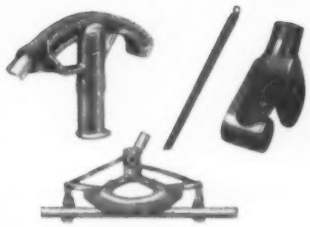

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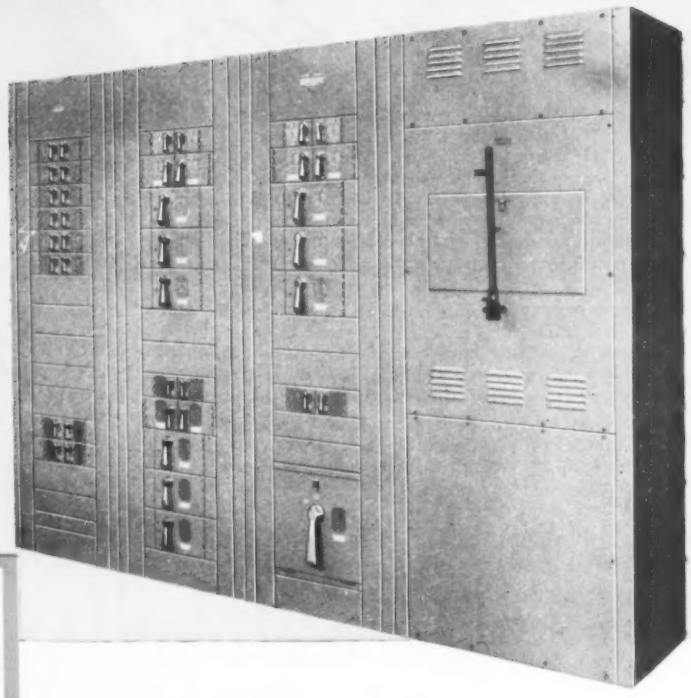

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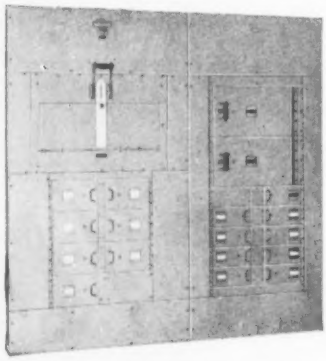

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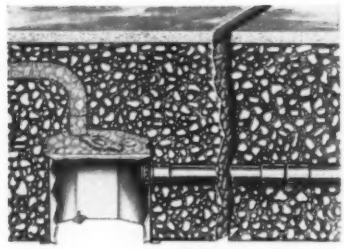

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430-39. A manual controller is likely to be mistaken for a disconnecting means. Therefore, it should open all ungrounded conductors.

This recommendation, perhaps, should be a requirement, especially where the controller has a position marked "off." Some controllers *are* required to open all ungrounded conductors under such conditions. Such a requirement for fixed electrical space heating is required by Section 422-29.

Section 430-109 has a new sentence added in Paragraph (b) for motors of 2 hp or less which states, "On a-c circuits, general use snap switches suitable for use on a-c (not general use a-c—d-c snap switches) may be used to disconnect a motor having a full-load current rating not exceeding 80 per cent of the ampere rating of the switch." This is the comparatively new general-use a-c snap switch which is also approved for controlling a-c inductive lighting loads up to the full current rating of the switch.

Section 430-109 has a change in Paragraph (d) for motors of over 50 hp requiring isolating switches which are not capable of opening stalled rotor currents to be marked "Do not open under load." This was only a recommendation in the old Code.

Selecting wire sizes

Table 430-146 (Old Table 20) includes circuit breaker and fuse sizes larger than 600 amperes as now recognized by the new Code. However, it no longer has wire sizes shown. It is now necessary, therefore, to multiply the motor full-load running current by 125 per cent (or add 25 per cent) and then select the wire size from Tables 310-12 through 310-15 (old Tables 1, 1-a, 2, and 2-a).

For example, a 15-hp, 3-phase, 220-volt, squirrel cage induction motor has a running current of 40 amperes (Table 430-150). Old Table 20 listed this directly as requiring No. 6 wire with either Type TW or Type RH insulation. Now, however, it is necessary to multiply 40 amperes by 125 per cent which equals 50 amperes. (40 times 1.25 equals 50). Then by Table 310-12 we find that No. 6 TW is listed for 55 amperes and No. 6 RH is listed for 65 amperes which indicates that No. 6 should be used if we select either of these types of insulation and use copper wire.

Aluminum wire as well as other types of insulation may be used instead, of course. With the same type insulation, No. 4 aluminum would be required by Table 310-14. If copper wire in Type MI cable is selected, then No. 8 may be used. (Table 310-12).

The fine print note above Table 430-146 states, " . . . The current values shown in Columns 2 and 3 must be reduced by 8 per cent for all motors other than open type motors marked to have a temperature rise of not over 40 degrees C as required by Section 430-32 . . . " This is an error as a result of an oversight. Section 430-32 now permits sealed (hermetic-type) motors to be protected at the same 125 per cent level as that permitted for open motors. Hence, this note applies now only to motors with a temperature rise exceeding 40 degrees C.

The first sentence of this same fine print note has an error, but it is of no consequence. It states, "These values are in accordance with Sections 430-6, 430-22, . . . " (among other section references). Section 430-22 of these references is the 125 per cent requirement for wire size, and since wire sizes are no longer shown in this table, the reference to this section has no meaning in connection with this table. The section is valid, however, in reference to Tables 310-12 through 310-15.

Table 430-151 (old Table 25) has had the maximum interrupting capacity in amperes for the first four listed single-phase sizes increased slightly. These four sizes are now consistent with the other listings in this table.

Transformer rule changes

Section 450-2 requires transformers and transformer vaults to be "readily accessible to qualified personnel for inspection and maintenance." This replaces the former more generalized statement that they be "located and arranged to minimize possible life and fire hazards." It seems as though the old wording could have been retained with the new requirement for ready accessibility added. Actually, however, the old wording was redundant in view of the same requirements and intent expressed in other sections of the Code, such as in Section 110-4, and in view of later more specific requirements in other sections of Article 450.

Paragraph (b) of Section 450-7 is new. It states, "Case or Enclosure. Dry-type transformers shall be provided with a noncombustible moisture - resistant case or enclosure which will provide reasonable protection against the accidental insertion of foreign objects."

Section 450-21 now recognizes transformers with Class H insulation. The temperature rise for Class B and Class H (80 C and 150 C respectively) is also listed in the new Code with the former reference to Standard C57-10 of the ASA deleted. This temperature rise listing which is associated with the two classes of insulation is necessary in the event that such transformers will be designated by temperature rises instead of by insulation classes—a practice which appears to be in the offing. Such insulation classes with these temperature ratings are required for dry type transformers of over 112½ kva if installed outside of vaults. (If the voltage exceeds 15,000, they must be in vaults in any case.)

Recognition for MI cable

Section 501-4 (a and b) as well as several other sections of the new Code for hazardous locations now include Interim Amendment No. 109 which recognizes Type MI cable for Class I, Divisions 1 and 2, locations. This section also deletes threaded EMT which formerly was permitted for Class I, Division 2, locations.

Section 501-5 includes sealing requirements for Type MI cable. This section also restores the requirement for seals in raceways of 2-inch size and larger which enter junction boxes or other enclosures containing splices, taps, or terminals. This requirement was omitted by error from the 1956 Code. (Actually, the requirement was restored in subsequent printings of the 1956 Code, but it was omitted from the first issue).

Section 502-7(b-3) recognizes resistors "which are part of an automatically timed starting sequence," as well as non-adjustable resistors which were already recognized, as suitable in tight metal housings without ventilating openings in Class II, Division 2, locations when operating temperatures do not exceed 120 C. Any other type of adjustable resistor must still have an enclosure of a type specifically approved for Class II locations.

Paragraph (b-4) of Section 502-14 is new. It states, "Motors, generators and other rotating electrical machinery shall conform to

Paragraph 502-8(b)." The section referred to lists the requirements for rotating machinery in Class II, Division 2, locations. It is referred to merely to cover any such machinery which may be a part of a signal, alarm, remote-control, or loud speaker system.

Section 503-5 has a new exception to the original requirement for control transformers and resistors in Class III, Division 2, locations. The original requirement is that the enclosures for such equipment comply with Section 502-7(b) which is Class II, Division 2, requirements for enclosures. The new exception requires enclosures for this equipment to conform with Section 503-4 which is enclosure requirements for Class III, Divisions 1 and 2, "when these devices are in the same enclosure with switching devices of such control equipment, and are used only for starting or short time duty."

Section 503-13 (Electric Cranes and Hoists, and Similar Equipment, Class III, Divisions 1 and 2) has been revised. The old Section 5083 required a device to automatically open the feeder circuit breaker when the insulation of the system fell below 1000 ohms. The new section requires a recording ground detector to give an alarm and automatically de-energize the contact conductors in the event of a fault to ground, or a ground fault indicator which will give and maintain both a visual and an audible alarm as long as the fault remains and the power supply is energized. The rest of the new section has been reworded and clarified.

Section 511-16 (Equipment above hazardous areas in commercial garages) has had the requirement for non-conducting outer casings for lampholders deleted. The requirement for guards or screens on lampholders of less than 12 feet above the garage floor has been changed to require them only "over lanes through which vehicles are commonly driven or which may otherwise be exposed to physical damage."

Changes in sealing requirements

Section 513-7 (Sealing—Aircraft Hangers) has been revised to delete the requirement for sealing raceways passing underneath hazardous areas unless such raceways lead into or through such areas. This new wording is now consistent with the wording in Section 511-4 for commercial garages.

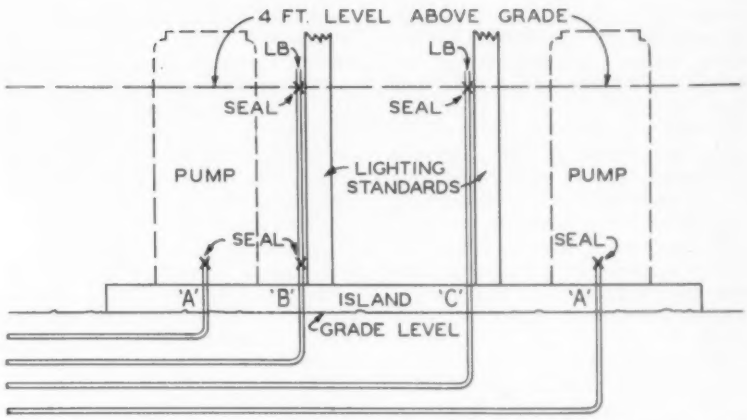

Fig. 1. Interpretation of 1959 Code rules applying to gasoline dispensing and service stations indicates that a seal is required at 4-foot level and also at point of emergence from pump island if pipe is stubbed off or turned up to a point slightly above slab as shown at "B" above. If pipe is turned up without a coupling to the 4-foot level as at "C", only one seal is required. One seal is all that is required at "A".

Section 514-6 (Sealing—Gasoline Dispensing and Service Stations) has a new fine print note which states, "This paragraph states that the first fitting after the conduit emerges from the slab or from the concrete of the island must be the sealing fitting. Above the fitting, the remainder of the wiring and equipment up to the four foot level is required to conform to the rules for Class I, Division 1 locations."

Section 514-6 itself to which this note has been added, requires seals to be provided also, by the provisions of Paragraph (b), at horizontal and vertical boundaries of the hazardous area. Since the vertical boundary of the hazardous area on the island is at the 4-foot level and therefore would require a seal at this point, and since the fine print note states that Paragraph (a) intends for a seal to be the first fitting in any raceway emerging from the island, then clearly not one but two seals are now required on an island for a light standard *unless* the conduit is turned up so that the threaded end reaches the 4-foot level.

With the conduit turned up to this height, the seal would be the first fitting and it would be at the 4-foot boundary of the hazardous area. If, however, the pipe is turned up so that the threaded end emerges only slightly above the island, a seal—not a coupling—must be placed on the threads. A second seal must then be placed at the 4-foot level in order to comply with the requirement for one at the vertical boundary of the hazardous area. And, of course, another seal must be placed at the horizontal boundary of the area where the raceway emerges at the panel end.

The first fitting emerging from the island for the pumps must be a seal, also. But this is not a new problem. Island lighting standards are the trouble makers here. Nowhere else in the Code is a threaded coupling objectionable when it is *within* a hazardous area *just so long as it does not come between the seal and the boundary line of the hazardous area.*

It is my belief that the wording of this section, in conjunction with the new fine print note, is contrary to the intent of the Code. However, until it is clarified, the contractor, in order to be safe, is advised to turn up his conduit for island lighting standards to the 4-foot level and put the seal there or use two seals. (See Figure 1.)

Flammable anesthetics

Section 517-4 (Wiring and equipment above hazardous areas—flammable anesthetics) has changed the requirement in Paragraph (b) so that only such equipment which is less than 8 feet above the floor is required to have "suitable guards or screens to prevent the escape of sparks or hot metal particles."

Section 517-6 (Circuits in anesthetizing locations) has been revised. Paragraph (e), which is new,

permits grounded circuits to supply equipment which is 8 feet or more above the floor except for surgical fixtures provided that such circuits are not in the same raceway as the ungrounded circuits and provided that they are controlled by switches which are either outside of the hazardous area or by remote control switches utilizing relays with the control circuit supplied by the ungrounded system. Paragraph (a) has an exception recognizing the new paragraph (e).

Paragraph (d) has been revised requiring the visual and audible alarms to function when any conductor of the system becomes grounded through a resistance or a capacitive reactance of any value up to and including 60,000 ohms. The former requirement was for an impedance of 10,000 ohms or less to activate an alarm.

Bowling alleys covered

Bowling alleys have been added to the exemplary list of places of public assembly in Article 520, and the word *capacity* is now used without the qualifying word *seating* so that whether permanent seating is available or not, if the building has a capacity of 200 persons or more (this formerly was 100 persons) it must be wired in metal raceways or Type MI cable.

The scope of Section 503-1 for motion picture studios and similar locations has been reworded so that the rules apply now to buildings "in which motion picture films more than 7/8 inch in width" are shown, stored, handled, etc. This replaces the old reference to films "other than approved slow burning cellulose acetate or equivalent motion picture films."

Section 600-2 has been revised to include circuit breakers as well as switches for the disconnecting means on signs and outline lighting. Paragraph (b) has an added sentence recognizing the general-use a-c snap switch for circuit control on such outline lighting and signs.

Section 610-13 has been reworded in Exception No. 5 permitting a wider range of selections for conductor insulations in high temperatures for cranes and hoists. Table 610-14(a) has been revised to allow greater carrying capacities in the 30-minute ratings of cranes and hoists, and the table has new columns recognizing higher temperature insulations.

Article 660 (X-Ray Equipment) has been revised considerably with definitions added, obsolete equipment deleted, and requirements clarified generally. Shockproof equipment is now required for all new apparatus and for apparatus in new installations. Reinstallation of old non-shockproof equipment can be done only by special permission.

Paragraph (b) in Section 660-12 is new and states, "Industrial or Laboratory Apparatus — Diffraction or Irradiation Types. Positive indication of energization by pilot lights, readable meter deflections or equivalent means shall be provided except on equipment or installations effectively enclosed or provided with interlocks to prevent ready access to live current-carrying parts during operation."

Paragraph (b) of Section 660-17 is also new. It states, "Low Voltage Cables. Low voltage connecting cables to oil filled units such as transformers, condensers, oil coolers, and high voltage switches which are not completely sealed shall be of the oil resistant type."

The changes in Article 710 (Over 600 Volts) were discussed in this department in an earlier issue

(Continued on page 107)

Questions on the Code

(Readers are invited to send in questions which they would like to see discussed in this department.)

Objectionable currents in multiple grounds

QUESTION: Section 250-21 states that where objectionable currents flow in ground conductors due to multiple grounds, one or more grounds shall be abandoned or their continuity shall be broken. Does it matter which connections are abandoned or where the continuity is interrupted?

ANSWER: Yes. The equipment grounding connection at the service must be maintained; and, if it is a grounded system, the system ground connection at the service must be maintained. In the latter case, a bond between the equipment ground and the system ground must be maintained. (A single grounding conductor is used to ground the equipment and the system to the electrode).

Examples of the primacy of these connections can be found in the Code. For instance, in Class I, Divisions 1 and 2, locations, Section 501 states in Paragraph (f), "Multiple Grounds. Where, in the application of Section 250-21, it is necessary to abandon one or more grounding connections to avoid the objectionable passage of current over the grounding conductors, the connection required in Section 501-16 (d and e) shall not be abandoned while any other grounding connection remains connected to the supply system."

Paragraph (d) of Section 501-16 states, "Wiring in a Class I location, when supplied from a grounded alternating current supply system in which a grounded conductor is a part of the service, shall have the grounded service conductor bonded to the raceway system and to the grounding conductor for the raceway system. The bonding connection to the grounded service conductor shall be made on the supply side of the service disconnecting means."

Paragraph (e) of Section 501-16 states, "wiring in a Class I location, when supplied from a grounded alternating current supply system in which no grounded conductor is a part of the service, shall be provided with a metallic connection between the supply system ground and the raceway system at the service entrance. . . "

For Class II locations, Section 502-16 has the same requirements by the provisions of Paragraphs (d), (e), and (f). In Class III locations, this same requirement is provided for in Section 503-17 by its reference to Section 502-16.

The system ground connection at the service equipment, together with the bond to the service enclosures and raceways, if properly done, limits the voltage impressed upon the circuits and the enclosures and also provides a low impedance ground return path to facilitate the operation of overcurrent devices. These connections, therefore, are of prime importance.

Protecting ceiling over a switchboard

QUESTION: I was criticized by the inspector for installing a switchboard which came within 18 inches of a ceiling because the ceiling was not fireproof. He required asbestos boards to be installed on the wood ceiling over the board. Is this a Code requirement?

ANSWER: Yes. Section 384-7 requires that a clearance of not less than 3 feet be left between the top of a switchboard and a non-fireproof ceiling "unless an adequate fireproof shield is provided between the board and the ceiling."

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Protect branch circuits against high overloads and "flash-shorts" with Pushmatic magnetic coil action! BullDog, the first to offer this protection in 15-amp and 20-amp ratings seven years ago, builds this safeguard *into every Pushmatic® breaker.* The solenoid (coil) —coupled with the thermal element— provides *double* circuit safety. Makes trouble calls a thing of the past.

As you can see in the above picture the Pushmatic uses a *multi-turn coil.* High overloads or "flash-shorts" instantly set up a magnetic field in the coil—causing the metal plunger to trip the latch and break the circuit. BullDog Pushmatics provide not only maximum branch circuit protection, but protect lamp and appliance cords, too!

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SPANG HD Conduit's uniformity provided easy, accurate threading and considerable time saving on the Georgia Power Company job.

"SPANG HD STEEL CONDUIT works up 5% faster than even its best competitors!"

says Mr. H. G. Millican, President, Millican Electric Company, Atlanta, Ga.

"We installed 23 miles of SPANG HD steel Conduit in the new Georgia Power Company Building in Atlanta," reports Mr. Millican.

"The speedier installation, which saved us considerable time, is due to the uniformity of SPANG Conduit. The hot-dipped galvanized finish is even. SPANG bends very easily and dresses out nicely. We had no problems of damaged wire from wire pulling.

"The bundling which SPANG uses makes a neat package. It's a tight bundle, easy to transport, stack for storage and handle on the job.

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Architect: Stevens & Wilkinson, Atlanta
General Contractor: Beers Construction Company, Atlanta
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SPANG Distributor: The Electric Supply Company, Atlanta

Finishing touches are applied to the Georgia Power installation. Note that fluorescent fixtures are suspended from the strong steel conduit runs.

23 miles of SPANG HD go into Georgia Power Company job

The new Georgia Power Company $4,250,000 general service headquarters building covers 387,350 square feet of floor space. It's one of the largest electrically heated buildings in the southeast.

Twenty-three miles of SPANG HD Steel Conduit protect the wiring which services the electric heating, fluorescent and incandescent lighting, and general power requirements. The fluorescent fixtures on this job are suspended from SPANG Conduit runs, demonstrating the strength of steel conduit.

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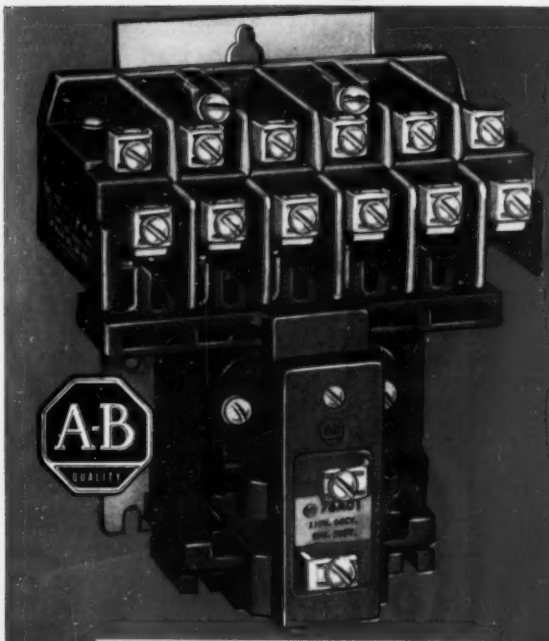


Bulletin 700 Type BR Relay with all six of the convertible poles arranged for normally open contact operation.

Allen-Bradley Convertible Contact CONTROL RELAY

BULLETIN 700

TYPE BR

Changeover made in seconds!

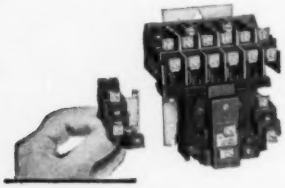
The contacts of the new Type BR relay can be arranged for either normally open or normally closed operation—and any changeover in the field can be made in seconds. A screwdriver is all that's needed.

This new A-B Bulletin 700 Type BR relay is ideal for use on automatic machines where control functions are frequently altered to meet production changes.

Quick convertibility of the contacts enables easy "on-the-spot" changes—from "normally open" to "normally closed"—or vice versa.

These new Bulletin 700 Type BR relays have been exhaustively tested to make sure that they will provide the many millions of trouble free operations for which all A-B controls are famous. In fact, the Bulletin 700 Type BR relays will establish new standards for long relay life and "reliability" of contact operation. Of course, they have double break, silver contacts that never need attention; also, the cast-plastic coil is impervious to the most severe atmospheric conditions.

Please write for full details, today!



Two extra convertible poles can be easily added—in the field

An auxiliary convertible contact pole—having full switching capacity—can be easily added to the left and right sides of the Type BR relays. These auxiliary poles are front-mounted and can be added without disturbing the wiring of the relay—and without removing the relay. All relays are designed to also accept stab connectors, and—all wiring terminals are readily accessible from the front.

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UTILITY ENGINEERING

Transmission — Distribution — Metering

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Installation

Testing
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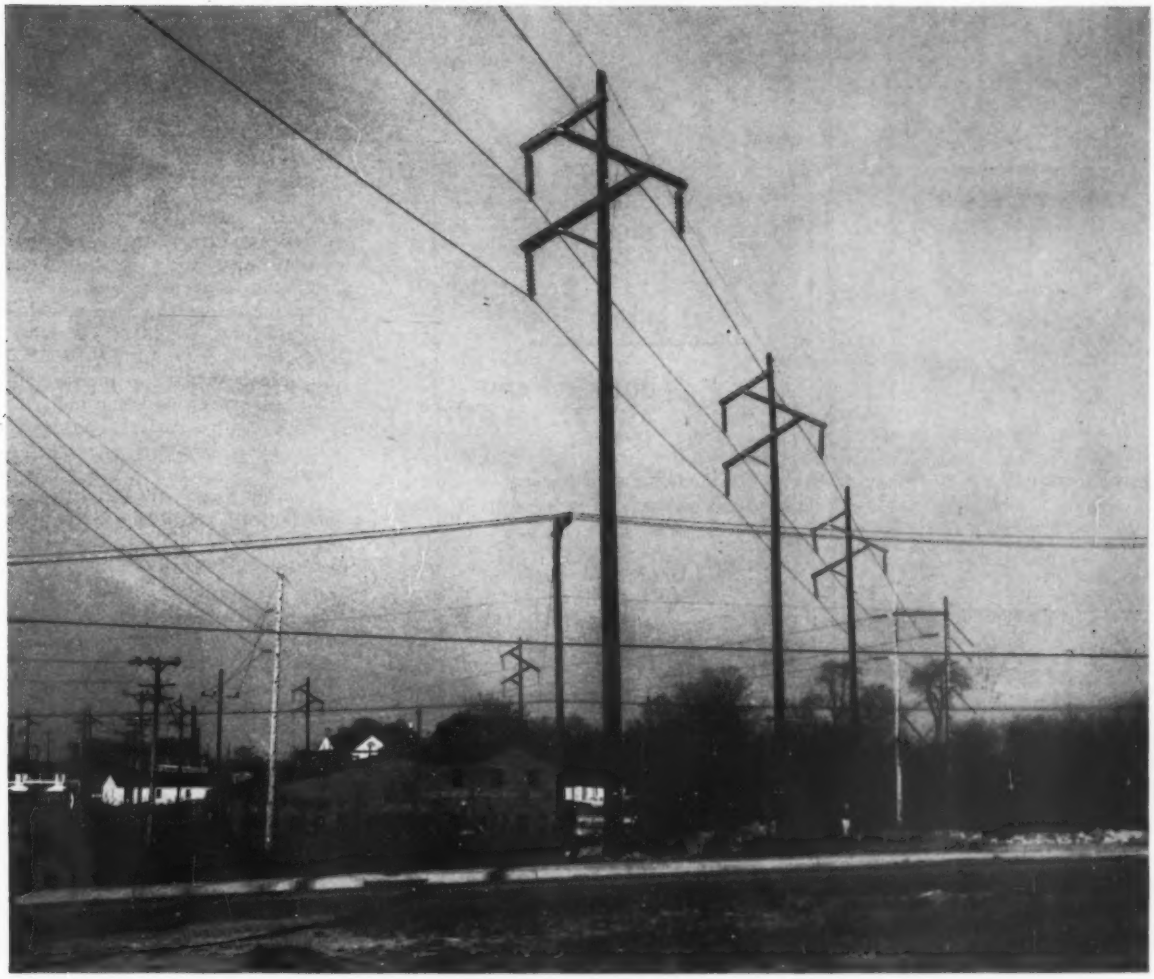


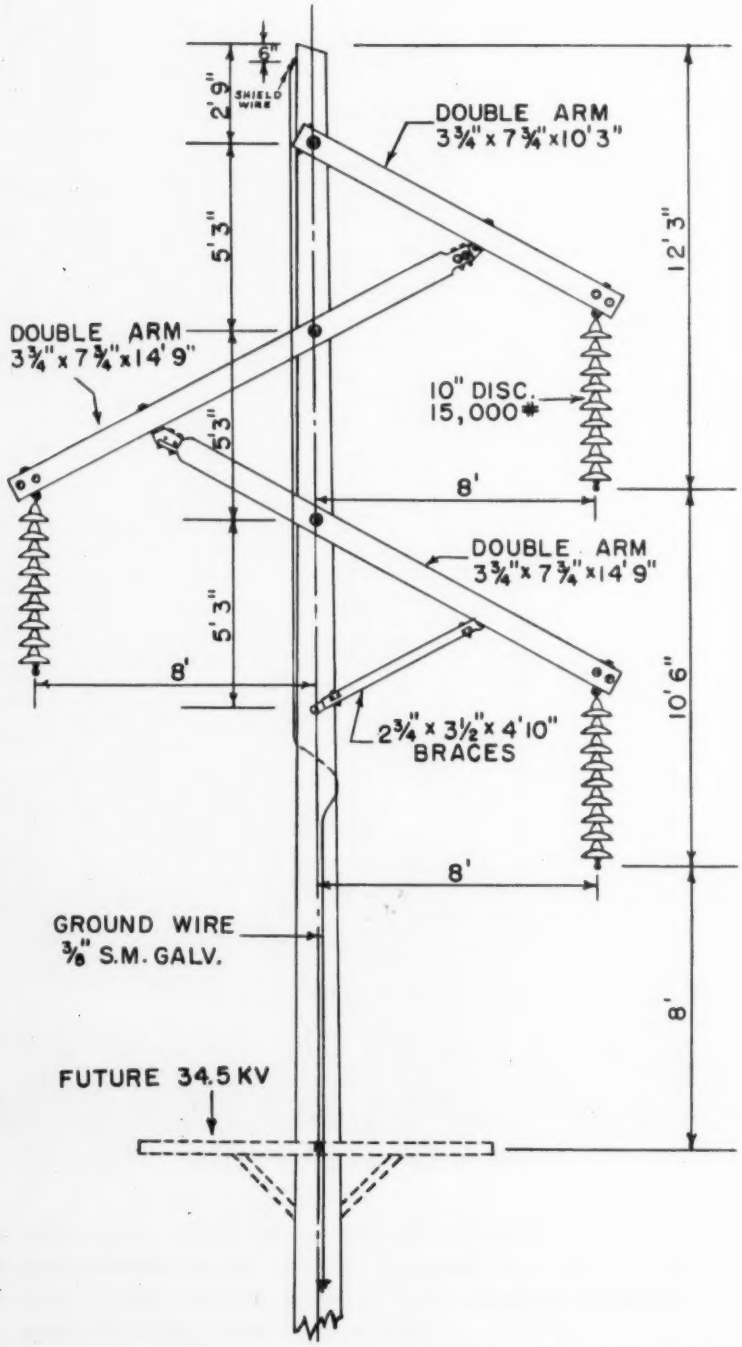
Potomac Edison designs single-pole construction for 132 kv line—see page 54

Underground service for residential areas—page 56
Overloaded lines indicated by three danger signals—page 60
Lightning protection on distribution circuits--Part 1—page 66
New electric utility products—page 79

Single pole construction for

By Lewis E. Lantz, Jr.

Civil Engineer
Potomac Edison Co.
Hagerstown, Md.



This drawing shows construction details for the single pole design, 132 kv transmission line put into operation recently by Potomac Edison Co.

◆ USE OF SINGLE POLE construction to bring a 132 kv transmission line through an industrial area within city limits saved The Potomac Edison Company five miles of line and provided space for a future 34.5 kv circuit as well.

In the original planning for a 132 kv line from Millville, W. Va., to Frederick, Md., conventional H-frame construction was contemplated for the entire distance. A preliminary study of the terrain indicated that with conventional construction at the Frederick end it would be necessary to make a wide detour beyond the Frederick Municipal Airport to provide adequate clearance and that this route would require two river crossings with ever present danger from floods.

Further study disclosed that if a satisfactory route could be found for a single pole 132 kv line through an industrial area within the city limits the total length of line could be shortened by five miles, and in addition space for a future 34.5 kv line could be provided. Because of the limited lateral space required by the single pole construction it was possible to obtain a satisfactory location through a congested area.

One of the principal problems in designing the line was to locate poles and provide height to avoid uplift of suspension insulators. The line crosses highways and city streets, railroads, a few buildings, various telephone and telegraph lines, three 34.5 kv and many distribution circuits, with a number of twists and turns, and distances between angle points vary from 185 feet to 1405 feet.

Poles framed after setting

These short tangents, with the small wire sag resulting from the limiting span length of 200 feet, made it difficult to locate the poles so as to prevent upstrain on the lightly loaded suspension insula-

132 kv line

tors, and in many cases pole heights had to be adjusted to within six inches to prevent upstrain. Because of this critical wire sag, and soil conditions varying from solid rock to earth fill in swampy areas, all poles were first set and then framed to get the wire supports at the proper elevations.

All wires were sagged by shooting with a transit their precalculated vertical heights, in a centrally located span in each pull, and their tensions were checked with a dynamometer. On the longest pull of 4,922 feet, containing five large angles, sags were checked in spans near the beginning and the end of the pull to make sure that the conductors had moved freely around the angles.

The line, 1.33 miles in length, was originally designed for a basic 65 foot pole but due to the congested nature of the area traversed the average pole height was 85 feet. The maximum height was 90 feet and the minimum height was 70 feet.

Above—a close up view of a typical pole showing details of the framing. Because of critical wire sag requirements, all poles were set first and then framed in order to get the wire supports at the proper elevation. Below—one of the several two-pole angles of the line.

Structure design

The single pole structures are designed to carry one 132 kv, one 34.5 kv circuit, and one overhead shield wire with a minimum safety factor of 4.0 for a transverse load of ½-inch radial ice and 8 pounds per square foot of wind pressure. All poles are "Life Span" penta treated. Maximum span length is 200 feet. Two pole angle structures are used wherever possible to keep pole heights to a minimum and prevent excessive insulator swing on adjacent single pole supports.

Separate calculations were made for each angle point to determine the type of structure, insulator swing, offset, and method of guying.

This single pole portion as finally designed consisted of 29 single poles, 7 two-pole angles, 1 two-pole deadend structure and 1 one-pole deadend.

The conductors for the 132 kv line are 556,500 CM ACSR 18 al./1

(Continued on page 107)

Underground service for residential areas

By G. T. Hays

Head, Underground Lines
Engineering Department
Dallas Power and Light Co.
Dallas, Texas

◆ THE INCREASE in load density in residential areas, the modern trend of real-estate developers and planners to lay out new additions with curved streets, cul-de-sacs, triangles and other irregularities, has increased the cost of building overhead distribution lines. Larger transformers with closer spacing, heavier poles, larger conductors and additional guying are required.

These facts together with the trend to outdoor living, plus the amount of investment now being made in houses, are creating a demand from our customers for underground distribution. The challenge facing the underground distribution engineer is to meet this demand with installations that compare favorably, in over-all cost, with pole line construction.

By the proper design of facilities and effective coordination with developers and other utilities, the cost of underground distribution for residential areas can be reduced.

This paper will show how Dallas Power & Light Company has met this problem in the past and what is being planned for future installations. With installations made and now in service, the cost of residential underground has been rather high. Several factors contributed to this high cost.

Probably the biggest contribution to high costs was lack of knowledge and experience both in the design and actual installation of these facilities. To date all extensions have been three phase, with no attempt at coordination with other utilities and finally most extensions have been for rather small developments, with development on one side of the easement or street.

The first underground installations for service to residences were installed in Windsor Park in 1953.

Existing installations

A plan of this addition, as shown in Figure 1, consists of only four lots with an easement in the rear of the lots. On the south side of the lots there is a golf course. All services are 120/240 volt, 3-phase 4-wire.

The primary cable is brought from an overhead circuit in an alley under a street to the easement in the rear of the lots. The primary cables were pulled into GI conduit from the potheads on the pole to the easement. From this point they were buried directly in the ground and encased in a sand cushion, with a 2-inch concrete slab over the sand. The primary circuit consisted of two rubber insulated, neoprene jacketed, single conductor, 15 kv cables and a bare neutral conductor.

The transformer vaults were semi-buried and placed on lot lines, so that two residences could be served from each vault. Judicious use of shrubbery enabled the owners to conceal this structure from the house and yard areas. In this installation the customer brought his service directly in to the secondary side of the vault. Four wires extending the length of the vault served as a secondary bus to which transformers and services were connected.

The fifth residence was later added to this addition, with the same type of construction except that it was necessary to cross a creek with the primary circuit. For this crossing the primary cable consisted of two lead covered cables with steel armour and a jute covering. These cables with the bare neutral were lashed to a heavy steel cable and anchored on each side of the creek with concrete piers. Sufficient slack was allowed and weights added to bury the cable in the creek bottom to prevent tree limbs and other rubbish collecting on the cables.

The transformer vaults for this addition were made in two sections. The bottom section consisted of a concrete pit with a floor area of 4 feet by 6 feet. It extends 2 feet below and 6 inches above ground level. The upper part is a removable section made of sheet iron and extends 4 feet 6 inches above the concrete section. Ventilation is provided in the upper section at the ends and top.

It might be of interest to know that some of the single residence customers in this addition have an annual kwh usage of 65,000. The cost for serving the first four lots was approximately $1,200 each, exclusive of transformers. The service to the fifth lot cost $3,200, also exclusive of transformers.

Kessler Lake Estates

In 1956, our company was asked to place lines underground for serving seven lots in a new addition. This addition is in a heavily wooded area with a lake and creek dividing the lots. Underground service to these lots was also conceived late in the development stages which added to the cost.

Figure 2 shows a plot plan of this development and the location of our equipment. Primary cables are buried directly in the ground as in the Windsor Park addition except under street pavement. The customer has brought his service cables into a vault or to a splicing box on a lot line.

In this addition there was no suitable place for an alley or easement and all construction was on the front of the lots between the curb and the property line. Transformer vaults are entirely below the surface. The vaults are reinforced concrete with a 5 foot by 6 foot floor space and 6 foot headroom. In the roof there are two gratings for ventilation and access purposes. Due to the contour of the land, we are able to drain all vaults into the lake area.

The cost of underground (exclusive of transformers) for serving these residences was about $1,500 per lot. The annual kwh consumption per residence is approximately 50,000.

The type of residence in the two additions described is well above the average type of residence ordinarily built and consequently has a rather high annual kwh consumption.

Marcus Estates

In 1956, we had a request from a developer to install underground facilities for 10 lots on Blanch Circle as shown by Figure 3. The type of home proposed for this addition was not so elaborate as in the first two additions. No provision was made by the developer for rear lot line alleys or easement, so again we were faced with placing the lines underground along the street.

The developer objected to a semi-buried transformer vault in front of the lot and agreed to provide drainage for the transformer vaults to a creek which ran along the rear lot line. He also preferred not to have the gratings which are ordinarily required for 3-phase installations in front of the lots.

Like the other two additions, the service to the customer is 120/240 volt, 3-phase 4-wire. The transformers were placed on adjacent lot lines in 36-inch diameter concrete pipe 6 feet long, and secondary cables installed between transformers to make the open wye-open delta bank. The concrete pipe extends 5 inches above the ground and is covered with a precast concrete lid.

No provision is made for ventilation. All heat from transformer and cable losses inside the pipe must be radiated out to the surrounding earth. Inasmuch as the losses are primarily from one transformer, it was thought that ventilation would not be necessary. To date we have had no excess heating.

The primary cable was the same type and installed similar to previous installations: direct burial under parkways and in conduit under streets. The secondary cables are insulated with rubber and have an outer jacket of neoprene. The secondary cables are buried directly in the ground above the primary and under the concrete protective cover.

The cost per lot for this addition for the underground facilities

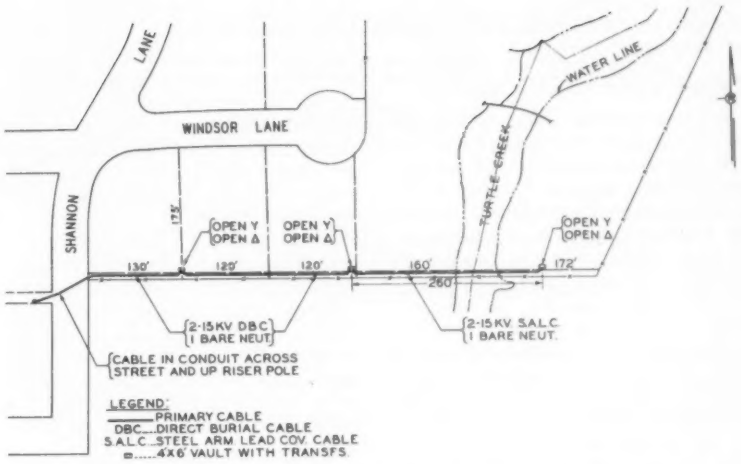


Fig. 1 - Distribution layout for Windsor Park, one of the first residential areas in Dallas served from underground construction.

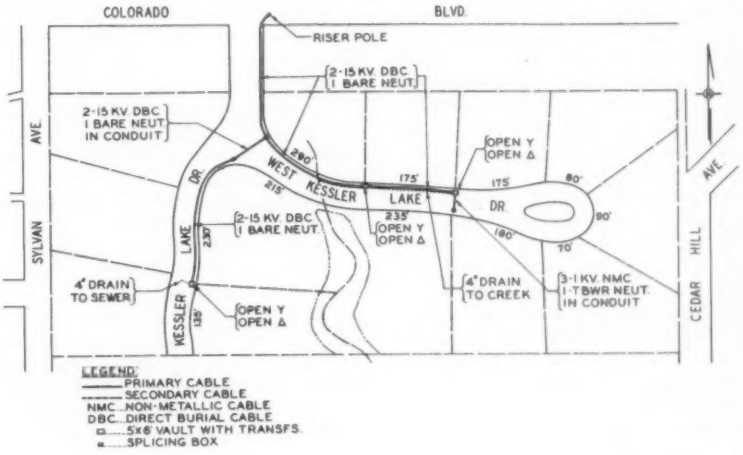


Fig. 2 - Kessler Lake Estates, another area served by underground.

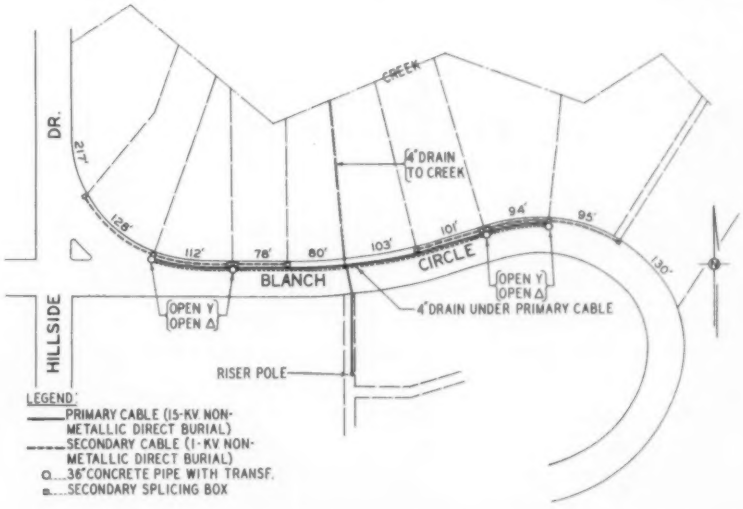


Fig. 3 - Marcus Estates, a subdivision of moderately priced homes, was served underground at an average cost of $650 per lot.

without transformers was about $650 per lot. The annual kwh used per residence is roughly 18,000.

Future plans for UG service

While we in the Dallas Power & Light Company feel that we have made some progress in the reduction of the costs for serving residential areas underground, we are far from satisfied. For sometime we have been giving considerable thought to finding ways and means of reducing costs for residential areas. We have been working closely with the telephone company and we have agreed tentatively to use the same trench for cables. This will reduce the overall cost to the two utilities.

In the past, all installations have been for a 3-phase 4-wire service, which requires larger or more transformer housings, two primary cables and a neutral, and a secondary bus inside the transformer vault. By serving future residences single-phase, 120/240 volts, the cost can be reduced considerably. Only one primary cable and a neutral would be required which would reduce the cost of the primary circuit $1.35 or more per foot depending upon the size of load. The vaults or housings for transformers could be smaller and we estimate that their cost can be reduced 25 per cent. The cost of the secondary bus within the transformer vault or housing would be practically eliminated.

We are now trying to encourage the use of single-phase instead of three-phase service to customers and have had a good response from residences served from our overhead system.

Our latest request for underground distribution was from the developers of an addition which will have about 250 lots on which will be built homes costing a minimum of $40,000.

We have drawn plans and made an estimate for serving this addition, using every known means of reducing the cost while still providing reliable service to our customers. The estimate was based upon the following assumptions, none of which have been worked out with the developer or other utilities.

(1) The installations of the various utility companies and the developer or his contractor will be coordinated to eliminate conflicts and delays. Each utility will have a definite location in the street, alley or easement and will maintain a certain depth.

(2) The addition will be cleared for construction with easements, streets or alleys to grade and property lines established.

(3) Transformers will be single-phase, 13200 GrdY/7620-120/240 volt self-protected, installed in a semi-buried housing.

(4) A service connection pedestal will be provided on a common lot line, so that two lots can be served from one pedestal. Service from the pedestal to the house will be installed by the developer.

(5) A loop primary system will be installed with each end of the loop fed from a separate feeder, and an oil switch, near the center of the load served by this loop, normally operated in an open position. This method was selected to reduce outage time due to failure of a section of cable, a transformer, or the loss of a feeder which serves the loop. The closing of the loop will add some cost to the primary, but when figured on a per lot basis it is considered by our company to be money well spent.

Construction details

To avoid providing drainage, which would be necessary when using overhead transformers in completely buried vaults, we propose to use a semi-buried vault for this project. There are several types of transformer housings available from manufacturers. However, after considering several of them, it was concluded that for larger installations, we can realize a saving by the use of a vault as shown by Figure 4.

The installation consists of a 3 foot by 3½ foot concrete box, 2 feet 8 inches deep, which extends 6 inches above ground level and a sheet metal hood which accounts for an additional 2 feet 2 inches of height, making the inside height a total of 4 feet 10 inches and the height above ground 2 feet 8 inches. A hinge on one side allows the hood to be opened and a lock on the opposite side prevents tampering.

Ventilation is accomplished by a

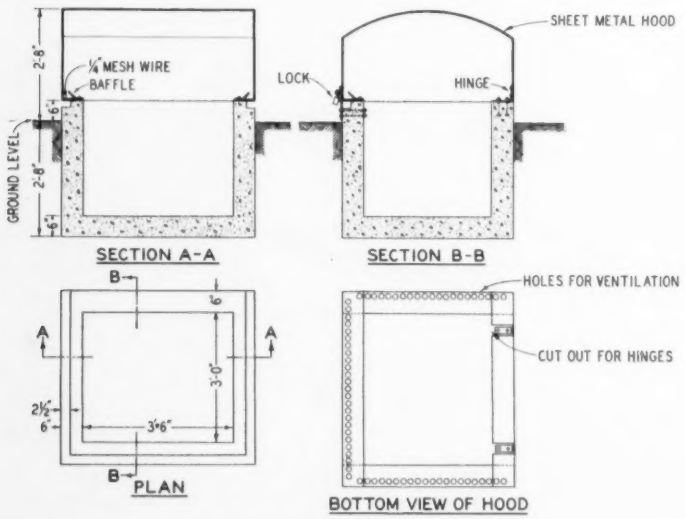


Fig. 4 - This transformer vault, half under and half above the ground, has been designed for future residential areas.

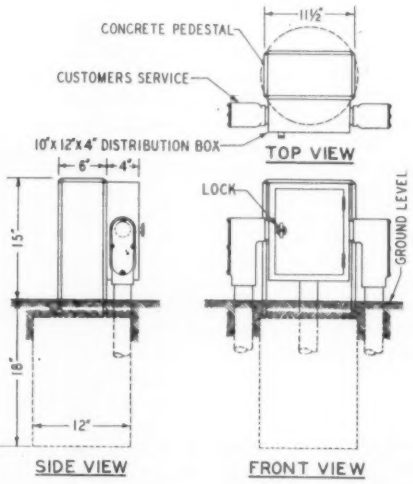
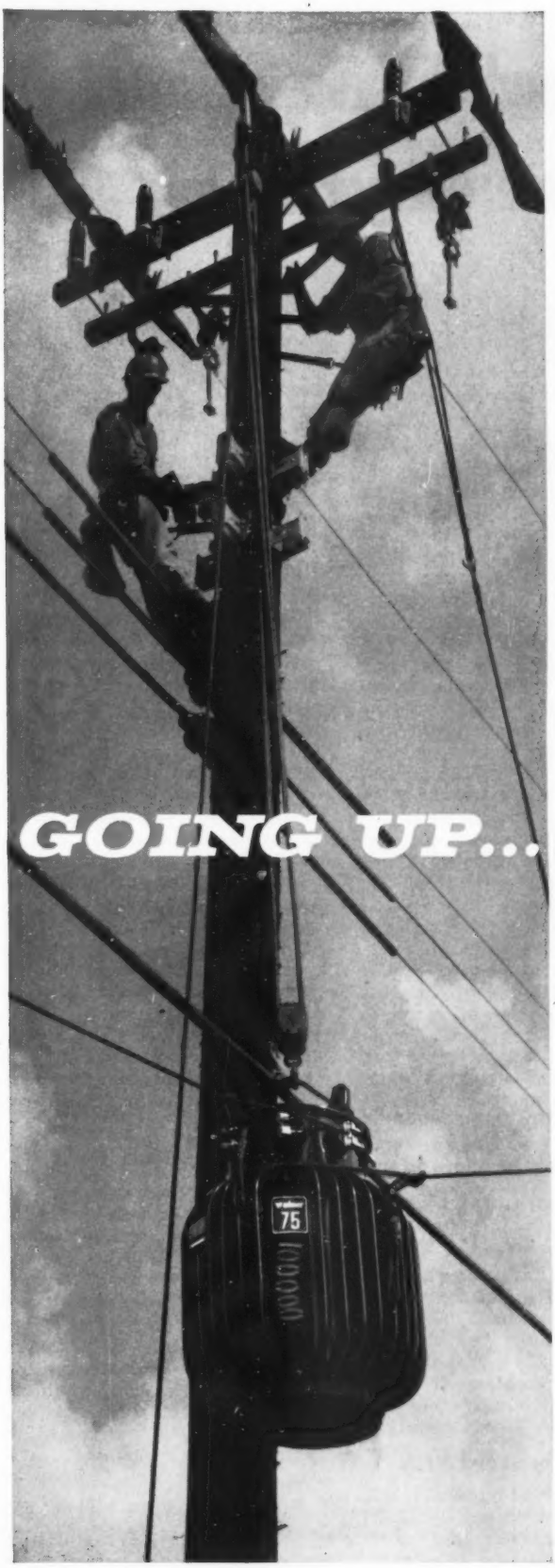


Fig. 5 - All service connections will be made from a pedestal mounted box.



100,000th DISTRIBUTION TRANSFORMER GOES INTO SERVICE...

Up she goes—to the cluster rack . . . Houston Lighting & Power Company's 100,000th distribution transformer. A 75 kva Wagner Form W. The milestone's job: transforming 7200 volts supply to 208 Wye/120 volts service for a shopping center.

One hundred thousand distribution transformers. Tangible evidence, these, of Houston Lighting & Power's ever-expanding service to a 5,600 square mile area that is "busting out all over" at a record-breaking rate.

Check this: the utility serves a population that is growing twice as fast as the national average. Last year its ledgers listed 450,995 customers, over seven billion kilowatt hours of power were sold. KWH sales per residential customer averaged 4,641, compared to a national average of less than 3,500. The company's generating capacity is at the two and one-quarter million kilowatt mark . . . will be up to three million kilowatts by 1961.

GOING UP... a Houston milestone

Small wonder that Houston Lighting & Power is one of the country's top fifty utilities. Small wonder, too, that we're pleased that a Wagner transformer marked a milestone for the company.

Wagner Form W pole-type transformers in ratings 3 to 167 kva are available from factory, branch and distributor stocks. They are designed to meet all electrical requirements of modern overhead distribution systems: high efficiency, low exciting current, low impedance, high short circuit and overload capability. They have mechanical features that give you easy installation, safe operation and long service life.

Consult your nearby Wagner Sales Engineer about your transformer requirements, or write us. Soon.

WT59-10

BRANCHES AND DISTRIBUTORS IN ALL PRINCIPAL CITIES

Wagner Electric Corporation

6440 PLYMOUTH AVENUE, ST. LOUIS 33, MO.

series of holes along three sides of the hood. Mesh wire placed over the holes and a metal baffle keep rodents from entering and wire or other objects from being pushed into the vault. At the present time, the largest transformer we plan to use is a 75 kva. This size can be installed in the vault with proper clearance for the high voltage bushings.

We estimate that this type of vault can be built for three hundred dollars or $75 per residence.

The transformer vaults will be placed on easements located at the junction of the property line between two lots and the alley or easement line. This will leave the alley clear for normal vehicular traffic and prevent the vaults from being damaged by trucks.

Service pedestals

To facilitate the connection of customers' services, a pedestal mounted distribution box is proposed as shown by Figure 5. The base of the pedestal will be 12 inches in diameter and will extend 18 inches below ground level. Above the ground the pedestal will be a rectangular post 6 inches by 11½ inches by 15 inches high. A metal distribution box 10 inches by 12 inches by 4 inches will be attached to this post.

Mounted inside this box will be a panel to which the secondary cable from the transformer vault will be connected. This secondary cable will be brought in through the bottom of the box in galvanized iron conduit. Customers' services will come in either side of the box, also in conduit. No more than two services will be connected in one box.

So that no service connections will be made in the transformer vault, a pedestal will be installed adjacent to each vault. Other pedestals will be placed on the opposite side of the street or alley from the transformer location with secondary cable in conduit from the vaults.

With this arrangement, all connecting of services can be done by meter crews without opening transformer vaults. Also it will eliminate the necessity of making splices on secondary cable. As with the vaults, the distribution boxes will be locked to prevent tampering.

The primary cable proposed will be a single conductor, insulated with a heat and ozone resistant rubber of sufficient thickness to

(Continued on page 106)

Overloaded lines indicated by three danger signals

By James P. Kelley
Engineer
McWhorter and Franklin, Engrs.
Nashville, Tennessee

◆ FOR MANAGERS and engineers of many electric distribution systems of the Central South, this is the time of the year when peak demands are recorded for their systems. And, during this peak load period, it is also the time when the systems begin to give trouble in locations where existing facilities are overloaded.

Sometimes such overloads may be anticipated; for example, where a large subdivision, with electric heat installed, is constructed at a distance from the substation in an area served by a small size rural line. However, most cases of overloaded facilities are the result of increases in consumer usage; and it is difficult to predict where overload caused by growth of this nature will occur.

Overloaded facilities should not be ignored because a slight overload this year can turn into a heavy overload by next year with serious outages, loss of revenue, and operating cost increases as the penality for delayed correction.

Once an area begins to have load growth, it seems to continue to grow for several years. The subdivision which is opened one summer will probably be added to the next summer; and in an area where one family buys a new appliance, whether it be an air conditioner in a city home or a deep freezer in a farm house, by the following year some of the neighbors will have one too.

This snowballing tendency of load growth within a growth area can cause bad problems if overloads caused thereby are not recognized and corrected promptly.

Locating overloaded lines

There are many approaches to solving the problem of locating overloaded lines. One method may be to obtain consumer usage statistics from billing records; and with this information, an area load study may be made by the system engineer.

Another method may be to establish permanent metering locations throughout the system to obtain current and voltage information from which a load study also may be made.

These two methods require the availability of engineering personnel who can spend considerable time on the necessary computations required to make the study.

However, the system itself will provide indications to show where there is overload. For, like the volcano which rumbles before it erupts, or like the storm which is preceeded by black clouds, an electric system also has tell-tale symptoms of trouble brewing. And to the manager burdened with the thousand and one details of running a complex day-to-day business, or the engineer who can never reach the bottom of his pile of service change applications, these indications can supply enough advance warning so that correction of the overloaded condition can be given the priority it deserves, in order that completion of needed changes may be accomplished before serious trouble results.

Danger signal No. 1

The first of these danger signals involves phase balance. In any substation area, ground relay settings make it mandatory that the load be balanced among the three phases. Much of our distribution has been built with three-phase lines radiating from the substation to feed three-phase loads, and then with single-phase lines continuing from the end of the three-phase lines or branching off from the three-phase lines to feed single-phase loads.

These single-phase lines are connected to the phases of the three-phase lines so that the load at the

¾ HOOK . . . preferred by linemen, makes it easier to engage the eye of the clamp to be removed. Extra-strong bronze ¾ hook seats deep in head casting to prevent twisting open. Note, too, how yellow color assures hi-visibility where it counts most . . . at the "business end" of the stick.

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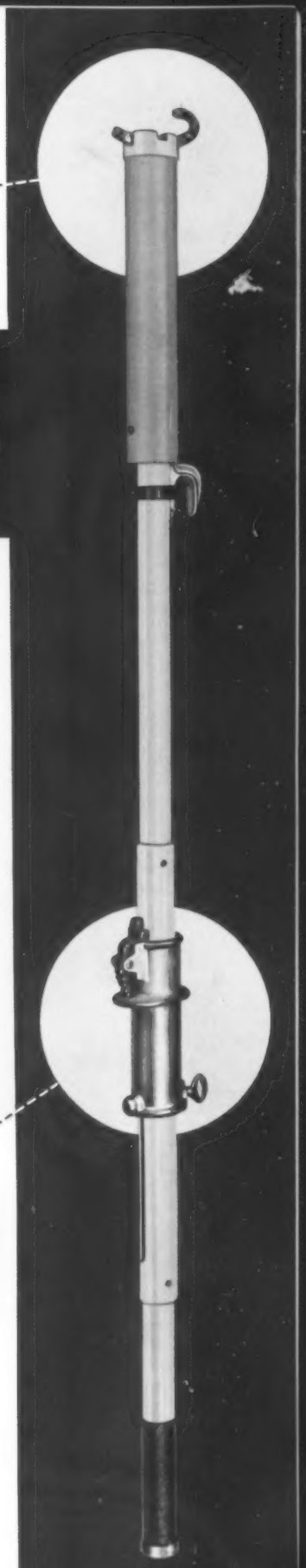

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NEW! **Smooth-as-silk operation... fully enclosed operating rod and mechanism... ¾ hook... thumb latch.**

Kearney's new clampstick combines the lightness, ruggedness and high dielectric strength of a Fiberglas pole with a slick new mechanism . . . plus an important bonus . . . yellow color permanently molded-in for maximum visibility. Needs no costly refinishing.

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Yellow non-porous surface instantly shows soil, grease or dirt which might cause excessive leakage . . . wipes "safety-clean" in seconds.

Tested for 100 kv per foot for 5 minutes.
Available in 4′, 6′, 8′, 10′ and 12′ lengths, one-piece or hinged.

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THUMB LATCH . . . conveniently located on aluminum operating handle. Faster, easier to use with gloves. In latched position keeps hooks open while engaging clamp eye . . . prevents accidental retraction of hook. Sharp downward pull of handle releases latch, closes hook. Safety stop prevents accidental opening of hook while clamp is engaged. A locking wing screw is also provided.

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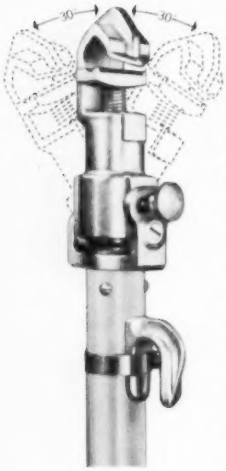
3 Kearney products to make the lineman's job easier...safer!

ADJUSTABLE HEAD JUMPER HOLDING TOOL



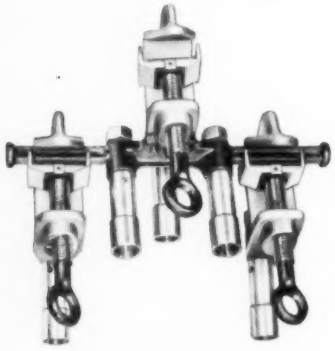
Aluminum alloy head is adjustable 30-degrees either side of center . . . rigid in all positions.

Gives positive control . . . tight grip . . . easiest handling of slack conductors. Enables linemen to maintain required safety clearance when working jumpers on difficult angles. Invaluable for accurately positioning jumpers at maximum reach from pole . . . for making hot line splices and taps.

Clamping screw has smooth, no-drag drive. Yellow Fiberglas handle and plastic covered, laminated fir, clamp-screw operating rod provide maximum safety. Light weight, wide range . . . 6 solid to 336.4 MCM ACSR. Pole length 4′ or 6′.

JUMPER CLAMP

Extra-wide range accommodates the large conductors of high capacity distribution systems . . . 1,192.5 MCM ACSR or 1,300 MCM stranded to 6 solid. Jumper cables up to 4/0 15,000 volts fit in the T-bolt terminal . . . without disassembly for installation. The aluminum alloy head will carry 400 amps. Maximum safety is assured by a yellow Fiberglas handle over the plastic covered, laminated fir, clamp-screw operating rod with colored-coded, non-slip gripping area. Light weight . . . only 4 pounds.



COMPRESSION FERRULE ALUMINUM GROUNDING SETS

The only "dead" or de-energized circuit is a *grounded circuit*. Get safe cable connections . . . less weight . . . with this family of grounding clamps for *aluminum* grounding cable. Ferrules are compressed onto the cable with the WH-1 or WH-2 hydraulic tool . . . threaded into the frame . . . locked with a jam nut. Take 600 volt aluminum grounding cable up to 4/0. Single grounding clamps and 2-, 3-, or 4-clamp cluster sets available in two sizes with ranges from 8 solid to 666.6 MCM ACSR or to 2″-diameter. Jaws of flat face clamp open 1.5″.

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801

substation is balanced enough to limit the residual (or unbalance) current to values below what is required to operate the ground relay. This arrangement is certainly the most economical method of serving an area, and it works fine as long as the load on the single-phase lines is light.

However, when load growth occurs in an area served by a single-phase line, and the load on this line reaches an appreciable amount (in the vicinity of 80 to 100 kilowatts for some systems), then if this line is deenergized, for example, by the lockout operation of a single-phase recloser in the line, the system will no longer be in balance at the substation, and it is probable that the ground relay will operate because of the unbalance and knock out the circuit at the substation.

Here is a situation which is bad when it happens, but it can get nothing but worse if no corrective action is taken.

Suppose the system employees manage to get the circuit rebalanced and operating while this line is out of service; then when the trouble is repaired and the line is ready to be reenergized, the whole circuit must again be rebalanced before complete service can be restored. A good bit of time will be required, and some fancy footwork must be performed before everything is going again; and as the last line truck rolls into the garage, everyone will give a sigh of relief.

But there remains a condition as dangerous as a cocked gun just waiting for the worst possible moment to go off; for, assuming that this area served by this single-phase line continues to experience load growth, the potential unbalance which will result if this line does go out again continues to increase. The next time an insulator goes bad, or a farmer chops a tree into the line, all thunder really breaks loose.

The two hour outage experienced last time turns into a four hour outage this time, and it's a good bet that sometime during the rat race the manager will think he will never get it balanced again. So, when it happens the first time, take steps so that it will be the last time. Take measurements in the growth area and check consumer records so that you can do what is necessary—possibly the three-phasing of a short stretch of line will be all that is necessary and peace of mind will again be yours.

Danger signal No. 2

The second danger signal of overload is the operation of a recloser because of load instead of a fault. This usually happens after a circuit which has been deenergized is reenergized, and a recloser out on the line operates. It might be a fault that causes the operation, but it can be overload, in that a surge of current to a cold load which equals the recloser's trip rating will look like a fault to it and so it will operate, usually to lockout.

An interruption of this kind can lead to a lot of line patrolling as well as to a lot of people who ordinarily never get out of the office being called liars after a night spent walking a line and finding nothing. This kind of business will get you nowhere, and a lot of managers have been known to swear to get rid of the whole lot of reclosers when this happens. However, a recloser is like a trusty in a prison, he is fine at first, but you have got to keep your eye on him!

Usually a lot of engineering goes into the selection and installation of a sectionalizing plan. Fault currents are calculated and loading is either field checked or arrived at by an educated guess before an expensive recloser is installed. Then it usually cures the trouble for which it was put in the line, and it is forgotten.

But load growth goes on and trouble begins again. Therefore, whenever there is an unexplained operation of a recloser, it is time to have some second thoughts about your whole sectionalizing plan. It would probably be wise to field check the load on not only the recloser, which is suspected of having to carry current in excess of its load rating, but also to initiate a program to load check all your sectionalizing devices on the line.

Your engineering staff can use the current readings from the field check to pinpoint any other devices which are having to carry excessive load current, and then prepare a plan for changing out the devices to a larger size, or relocating them as necessary.

At such times, consideration may be given to the advisability of sending some of the devices to be reconditioned and overhauled because every sectionalizing device has a set duty cycle prescribed by the manufacturer, usually so many operations before overhaul, because of the limited life of current breaking contacts as well as contamination of the insulating oil.

When these things are done, the manager will be confident that his reclosers are doing what they were meant to do, and they will be fighting for him instead of against him.

Danger signal No. 3

The last danger signal given by overload is the one everyone knows best - customer low voltage complaints. When a complaint of this nature is evaluated, the possibility of load growth being the cause must not be overlooked.

In many instances, operating employees treat all low voltage complaints with the same remedy —changeout of transformer, or secondary, or service, or relocation of transformer nearer the customer's entrance. If these remedies won't work, they try to ignore the complaint for as long as possible, sometimes with unfortunate consequences. But low voltage is like a nagging backache in that there are many causes, and for every cause there is a cure.

Changing transformers won't help much if load growth has caused voltage drop in the primary lines to become excessive. It won't help either if the transmission system has become overloaded because of load growth which shows up as low voltage at the substation. Therefore applying the wrong cure is futile as well as expensive.

The over-all picture must be studied, and if it appears that load growth may be the cause of the complaint, then engineering studies should be undertaken to determine the proper and most economical solution.

These three danger signals—phase balance problems, overloaded recloser operations, and customer low voltage complaints—can start the ball rolling towards efficient correction of facilities which are overloaded if they are recognized as being bona fide danger signals. All too often, they are treated only as cases of trouble to be corrected by the best means possible and then forgotten. This will provide only an inadequate and temporary solution to a problem which will continue to recur with more and more serious effects.

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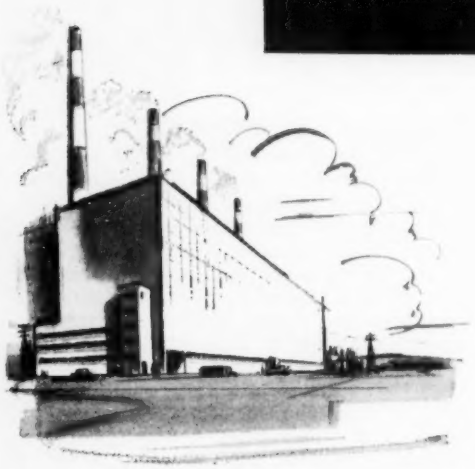

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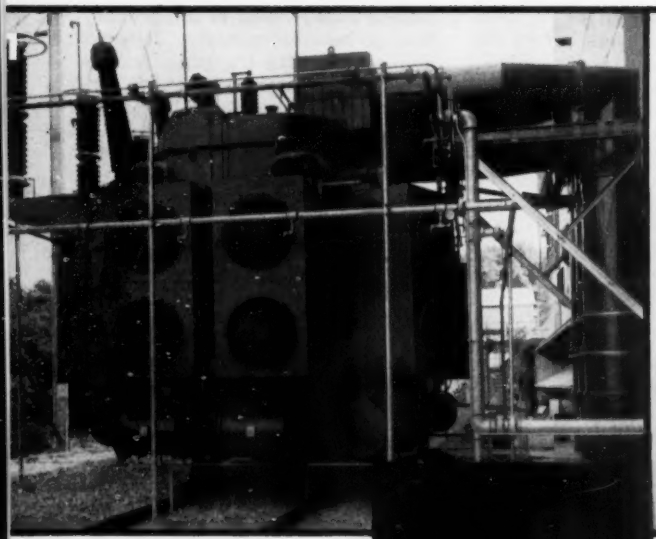

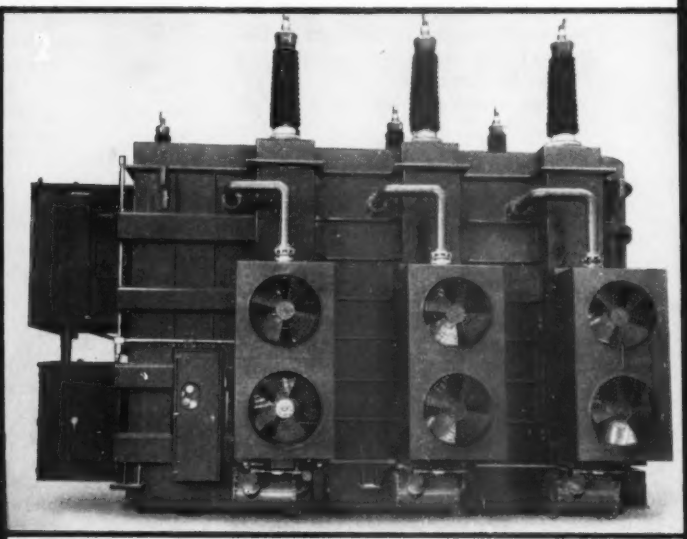

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New Orleans Public Service, Inc.

4 *125,000 KVA, Class FOA, 13.8—138 KV, LTC*
Union Electric Company

5 *100,000 KVA, Class FOA, 14.4—161 KV, LTC*
Iowa Power and Light Company

6 *20,000/26,667 KVA, Class OA/FA, 132—12.6 KV, LTC*
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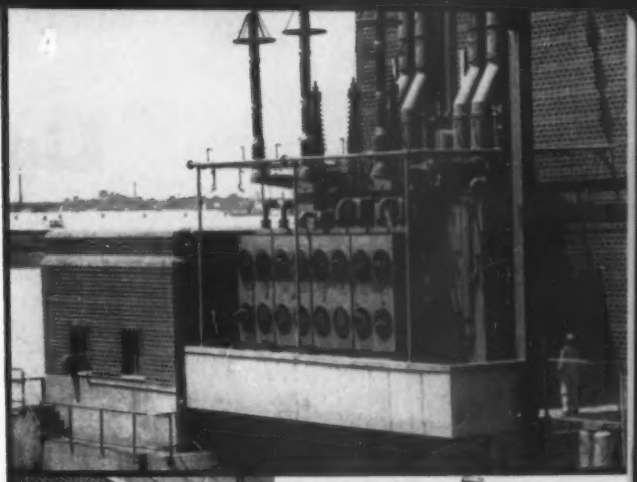
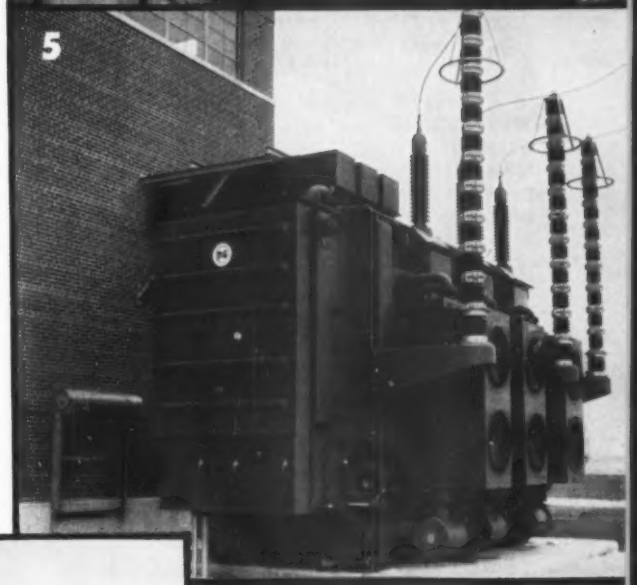
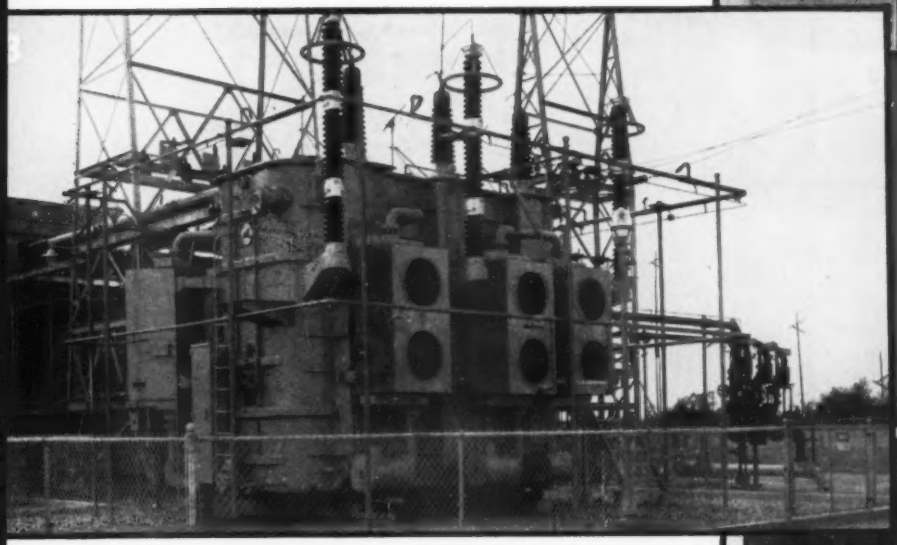






Industry and Electronic Applications

SALES OFFICES IN ALL PRINCIPAL CITIES

Lightning protection on distribution circuits

Part 1: New construction

By H. L. Deloney

Assistant Chief Engineer
Louisiana Power and Light Co.
New Orleans, La.

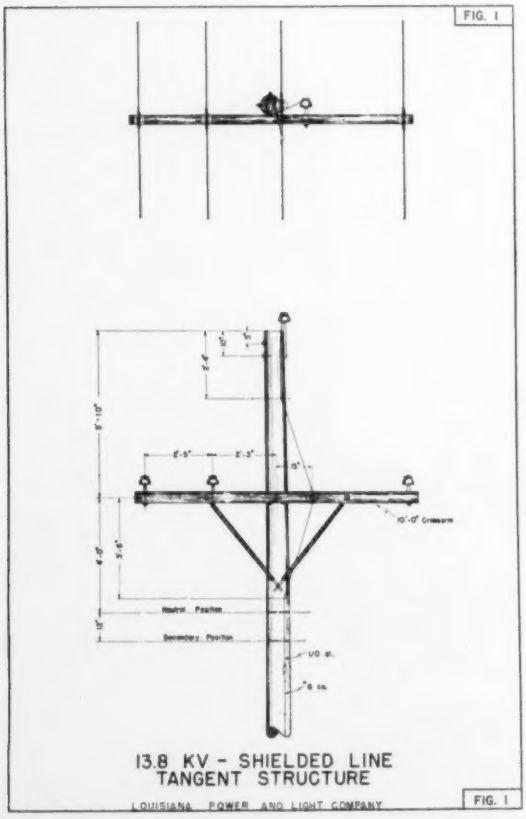
◆ CONTRARY to the opinion of many distribution experts, it *is* practical to obtain effective lightning protection on distribution primary circuits. The growing dependence on electric service in all walks of life—in the home, place of business, and recreation establishments has made the general public much more conscious of service quality, and service outages of any kind are getting more and more intolerable.

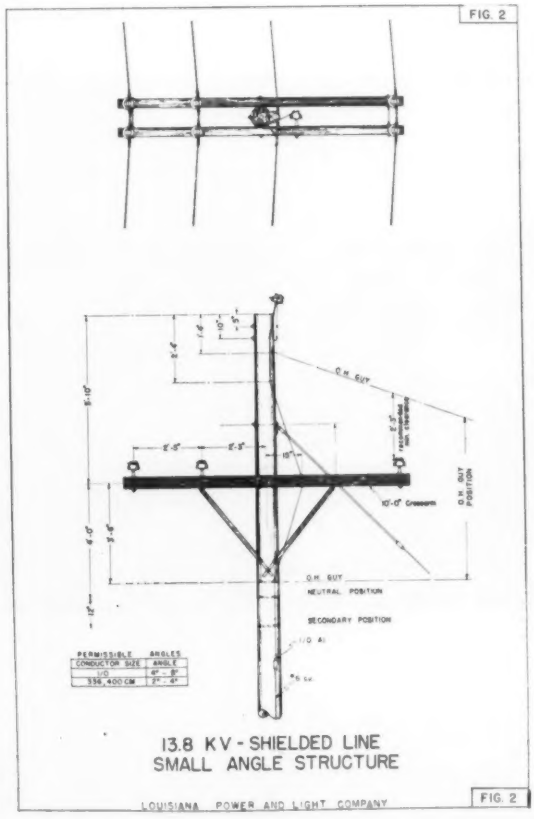
Louisiana Power & Light Company now has in operation approximately 420 miles of 14.4 kv, 30 miles of 25 kv, and 140 miles of 34.5 kv distribution lines with overhead shield wires. It also has several circuits of 14.4 kv, and one 24 mile circuit of 34.5 kv construction protected with arrestors. We also have most single-phase, 8 kv laterals in all urban areas effectively protected with arrestors. Some of the earlier shielded installations date back to 1941.

Our experience with the various lightning "proofing" approaches tried have convinced us that we can effectively and economically eliminate the vast majority of outages and structure and equipment damage incidents on distribution circuits caused by lightning.

With conventional unshielded 15 kv construction, we experience approximately 200 to 250 trip-outs per 100 miles per year. With the various approaches to lightning "proofing," these lightning caused trip-outs are reduced to 1-½ to 15 trip-outs per 100 miles per year, depending upon the protective method employed.

Our 115 kv circuits show a trip-out record of approximately 40 per 100 miles per year for the un-





shielded circuits and from 1 to 5 for the shielded circuits. These figures may appear high to some of you, but Louisiana is in one of the highest lightning probability areas of the country, having an isokeraunic level above 70.

Perhaps the early impression that it was impractical to protect distribution circuits by shielding was engendered by comparison of the basic impulse levels of the lower voltage circuits (100 to 300 kv) with those of higher voltage transmission lines which run from 1,000 kv to 2,000 kv and above. To raise the BIL of the distribution circuits to such levels is obviously impractical from a physical as well as economical standpoint.

The factors that make shielding of the distribution circuits feasible without going to the transmission BIL levels are: reduced span length and shorter down leads from the shield wire to ground. Most transmission circuits employ span lengths from 500 to 1,300 feet, with structure height ranging from 55 to 130 feet.

Distribution circuits, on the other hand, employ span lengths in the 125 to 250 foot range, and heights from 25 to 45—especially in urban construction, where the most emphasis is usually placed on service reliability. This, of course, is also the place where lightning proofing methods can best be justified due to the larger load densities and the fact that the overall incremental cost of protection, per unit of load, is much less than on long rural feeders.

Shielded distribution design

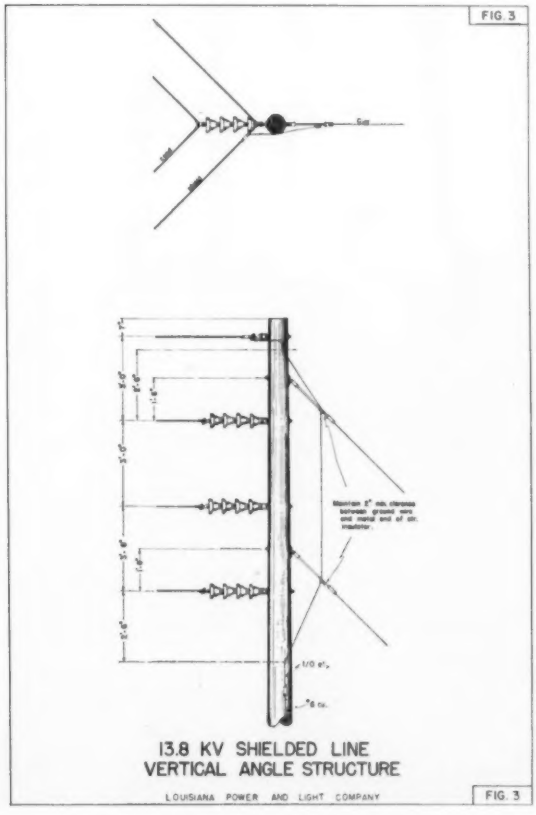
Louisiana Power & Light Company has several designs for new distribution line construction which involve varying application considerations and result in slightly different performance expectations. Figures 1, 2, 3 and 4, designate details of the tangent, small angle, medium angle, and heavy angle structures normally used on single circuit commercial and residential feeders.

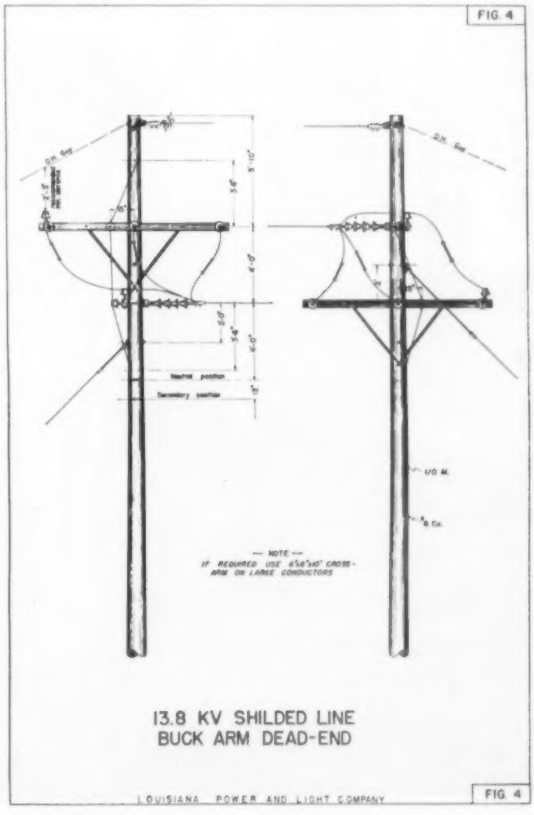
This design utilizes 10 ft. arm with wood braces, in place of the 8 ft. arm and steel braces normally used on unshielded circuits. The BIL for the design is approximately 500 kv (two insulators plus 3 ft. of wood on horizontal configuration structures), and 700 kv (four 6-inch disc insulators and 3.5 ft. of wood on vertical angles). Calculated lightning outage expectancy is in the order of 1.65 trip-outs per 100 miles per year (based on 200 foot span, isokeraunic level of 70, and tower footing of 15 ohms), contrasted with 250 trip-outs per 100 miles per year on unshielded circuits.

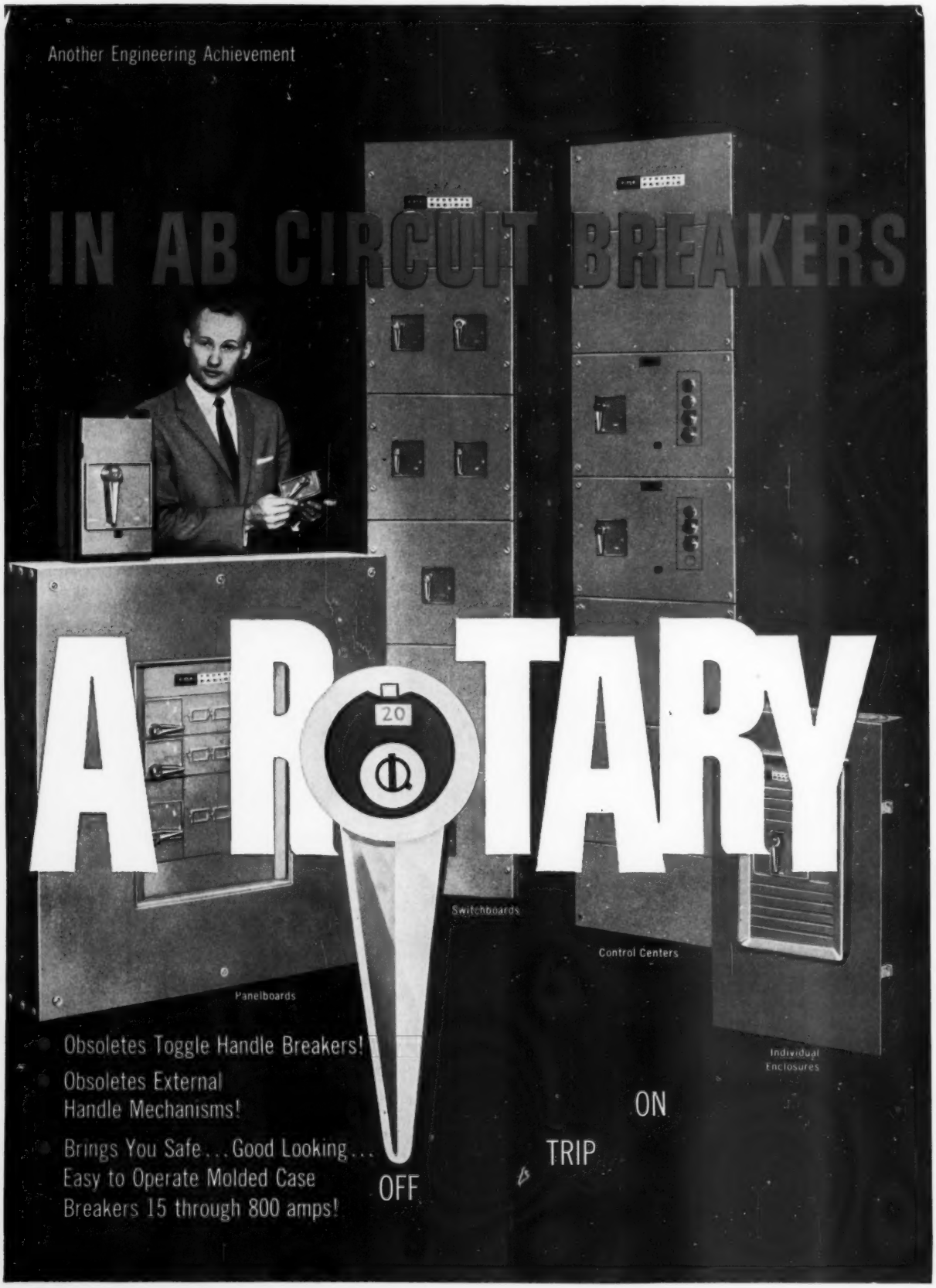
On new construction where the overhead shield wire is also used as the common wire for primary and secondary neutrals, incremental cost of shielding is only $400 to $500 per mile. The tremendous improvement in performance plus the additional reduction in equipment damage and structure damage, which usually create the sustained outages, more than justifies shielding on most new three-phase circuits in urban commercial and residential areas, and in most cases on rural main circuits.

Single-phase laterals

While I am on the urban distribution subject I would like to emphasize one of the main advantages of sticking to the single-phase system on residential laterals. Aside from all the economic advantages to be gained in favor of



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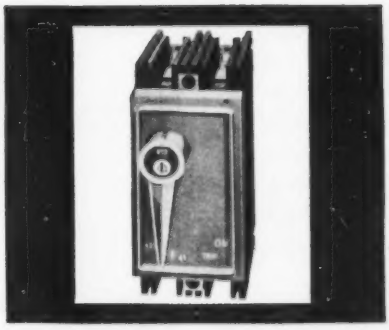

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single-phase over three-phase construction, we almost inherently get perfect lightning protection on the single-phase laterals by the time we get through putting lightning arrestors on all the transformer installations.

Where load density does not require transformers on about every second or third pole, it is possible to go in and install a few arrestors on the intervening gaps at about every other structure.

How BIL was raised

Our new specifications for single-phase angle and dead end structures will call for guy strain insulators to raise the BIL. On lines built to older specs where guys were brought too close to insulator attachments it is necessary to either add insulators to the dead end strings, cut in guy insulators, or add a lightning arrestor. In many cases, the lightning arrestor is the cheapest application after considering installation cost.

Getting the single-phase residential policy across to the public, the air conditioning dealers, and utility has been quite a task to date, but much progress has been made. Single-phase air conditioning units, with comparable operating efficiencies and even superior power factor and starting characteristics, are now available to help us "sell" the policy. Multiple units in the 2, 3 and 5 ton capacities can be put together to satisfy the needs of all except the very largest homes. Costs to the customer are almost identical with three-phase over-all installed costs.

With the single-phase lateral as outlined, lateral fuse blowing is practically eliminated insofar as lightning is concerned. To accomplish this degree of lightning protection on three-phase laterals would require $400 to $500 per mile for shielding, alone, on new construction, and $450 per mile for adding necessary arrestors on a two-wire primary, or $900 per mile on a three-wire primary circuit (assuming that one phase gets sufficient protection by virtue of transformer installation).

Transformer fusing policy

Transformer and lateral fuse failures were naturally one of our first concerns in the matter of improving service reliability. With the thousands of miles of rural circuits involved, lightning was one of the largest factors in service interruptions and operating costs.

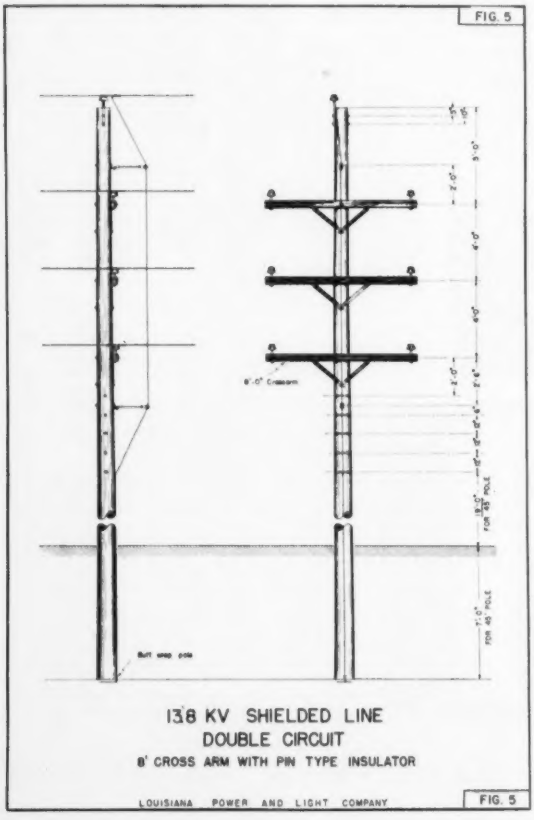
We spent considerable time in fuse testing and application trials attempting to get a better answer to the fusing problem, particularly on the 1-½ to 25 kva transformer sizes at 8,000 volts and 13,800 volts —where fractional ampere fuses were called for, since these smaller sizes were particularly susceptible to blowing from lightning surges.

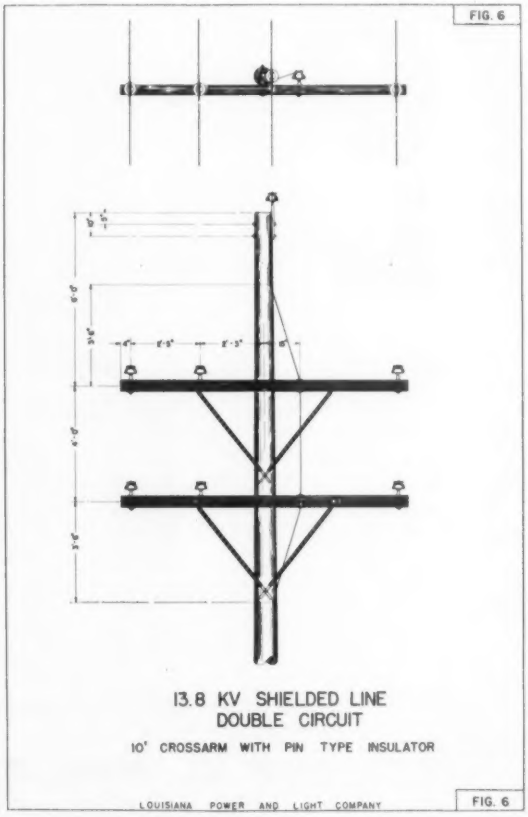
Special fuses in use

When the "dual-element" type of fuse first appeared on the market, it appeared to be the answer we were looking for, but early experience proved that the links first available were not too satisfactory. We asked one of the fuse link manufacturers to design a "dual-element" link to fit characteristic curves we had drawn, which had short time characteristics approaching a conventional 10 ampere link for all sizes below 10 amperes, and which had overload characteristics about 50% above the NEMA transformer loading curve.

Such a fuse was made available

(Continued on page 76)





ALLIS-CHALMERS ANNOUNCES

ALL-NEW JFR REGULATOR

Lower, lighter up to 40%!
For use anywhere in your system

1. Electrical resettable drag hands on position indicator, reset from push button in control panel.
2. Oil-sight gauge in tank wall reveals oil level at all times.
3. Horizontal *external* by-pass arrester offers high-voltage protection.
4. Easily read, six-digit, direct-reading counter records JFR's life history to one million operations.

. . . And 19 more customer benefits.

Where to get more JFR regulator facts fast—Bulletin 21B7977E.

Call, write or wire...

NATIONAL ELECTRICAL WEEK
FEBRUARY 7-13, 1960

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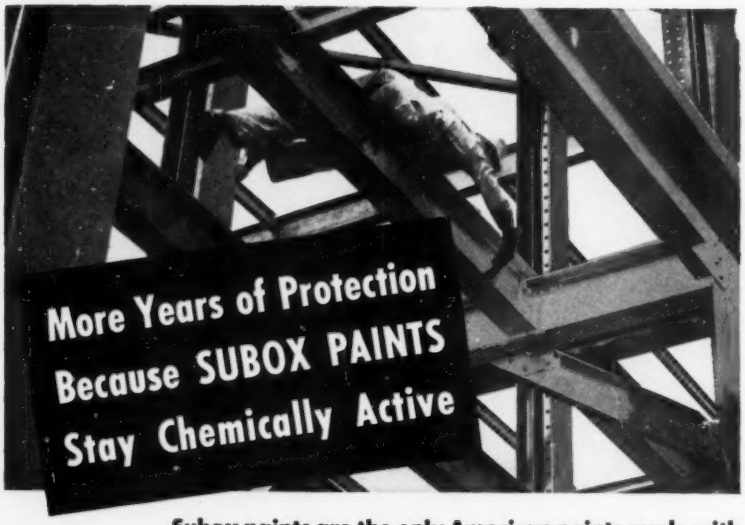
ALLIS-CHALMERS

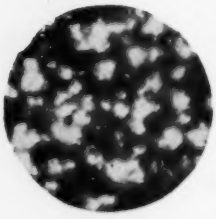
"Originators of ⅝% Step Regulators"



Subox paints are the only American paints made with lead-suboxide. They give extra protection at no extra cost.

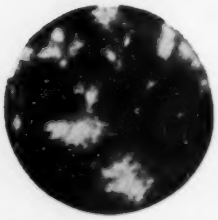
SMALL PARTICLES PENETRATE SURFACE

Maximum penetration is achieved because lead-suboxide is a colloidal pigment. Its film is so dense and impervious that two coats of Subox usually equal three coats of other paints . . . often one coat of Subox is sufficient.



CHEMICALLY-ACTIVE METALLIC FILM

Lead-suboxide remains chemically active after Subox paint dries. It reacts with the fatty acids of the vehicle to form insoluble lead soaps, and builds up a reinforced protective film of intertwining metal-bearing fibers.



FIBROUS COAT IS STRONG ADHESIVE

The fibrous film of Subox gradually strengthens and replaces the original vehicle film (which otherwise would become brittle), and creates a strongly adhesive protective coating with an inherently longer life than that of other paints.

Dark areas in above photomicrographs show how pigment increasingly intertwines to form dense, protective film.

In addition to its other advantages and economies, Subox also saves on eventual repainting. The need for expensive scraping and repriming is largely eliminated.

Available in wide color range. Write for color card and the brochure "Subox Paints".

SUBOX PAINTS

Subox Inc.

Trade Mark

Subox Company of Canada—Weston, Toronto 15
23 Fairmount Plant
Hackensack, N. J.

Wanted:
Manuscripts
for
publication

The editors of Electrical South will welcome contributions from the field for publication. Electrical contractors, consulting electrical engineers, light and power company engineers, and others closely associated with the electrical industry are invited to submit articles, photographs, and drawings relating to important and interesting electrical projects in the South and Southwest.

Articles are wanted in two principal classifications:

***Wiring and Lighting:* Articles on interesting and unusual electrical installations; any phase of electrical contracting such as business promotion, estimating, handling men and materials, etc.**

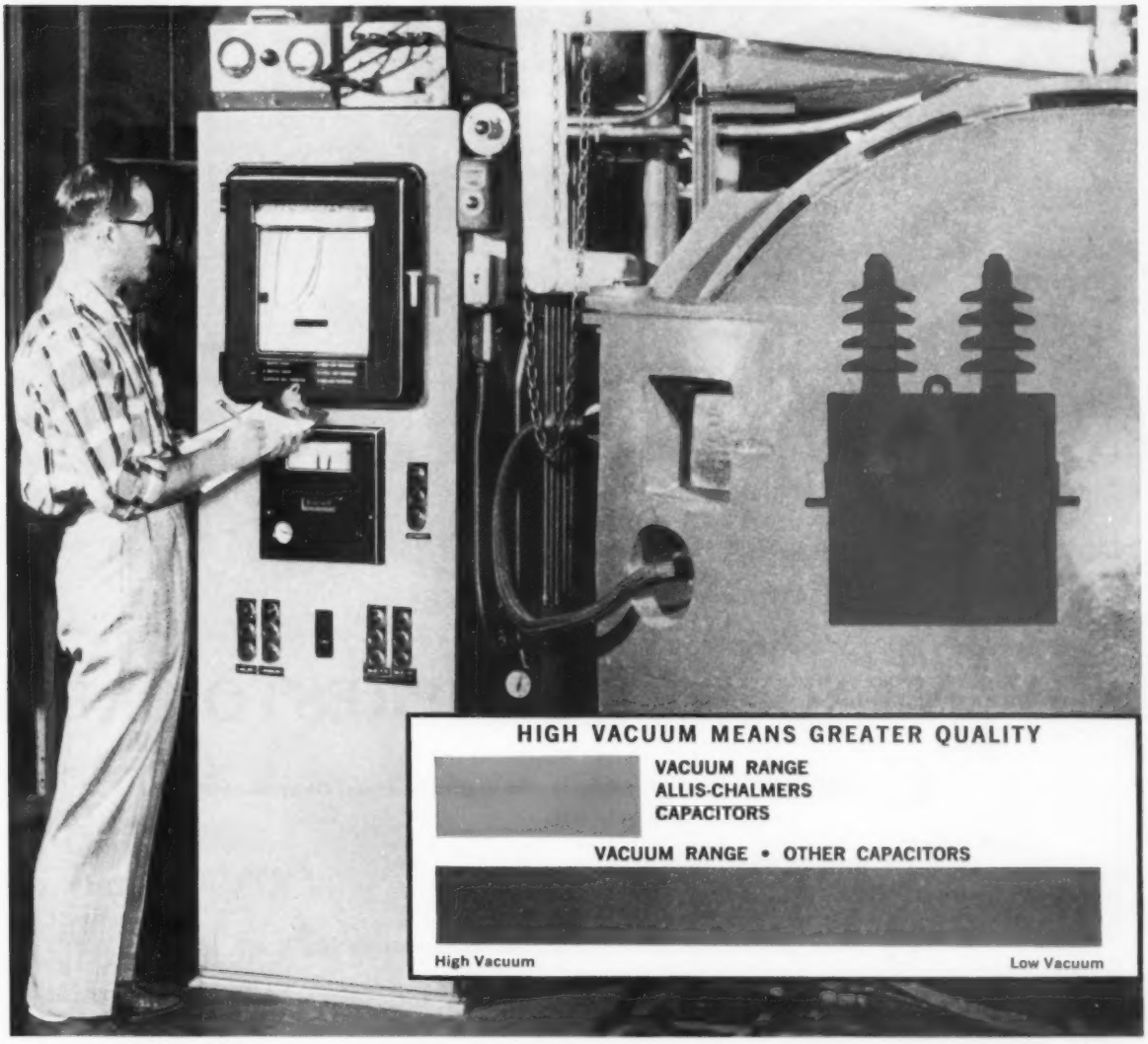
***Utility Engineering:* Articles relating to any phase of transmission, distribution, and metering, including design, installation, testing, and maintenance. These articles should be "by-line" articles carrying the name of a Southern or Southwestern light and power company.**

All articles will be given careful consideration and payment will be made promptly for all material accepted for publication.

Address all communications to the editor:

Electrical South
806 Peachtree,
Atlanta 8, Ga.

ALLIS-CHALMERS



Extra years of capacitor life

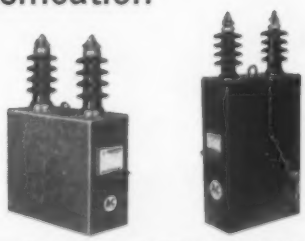
through "extra-low" drying and degasification

Why take the trouble to extract air and moisture with high vacuums? This is to guarantee that you get the greatest return from your Allis-Chalmers capacitor dollar!

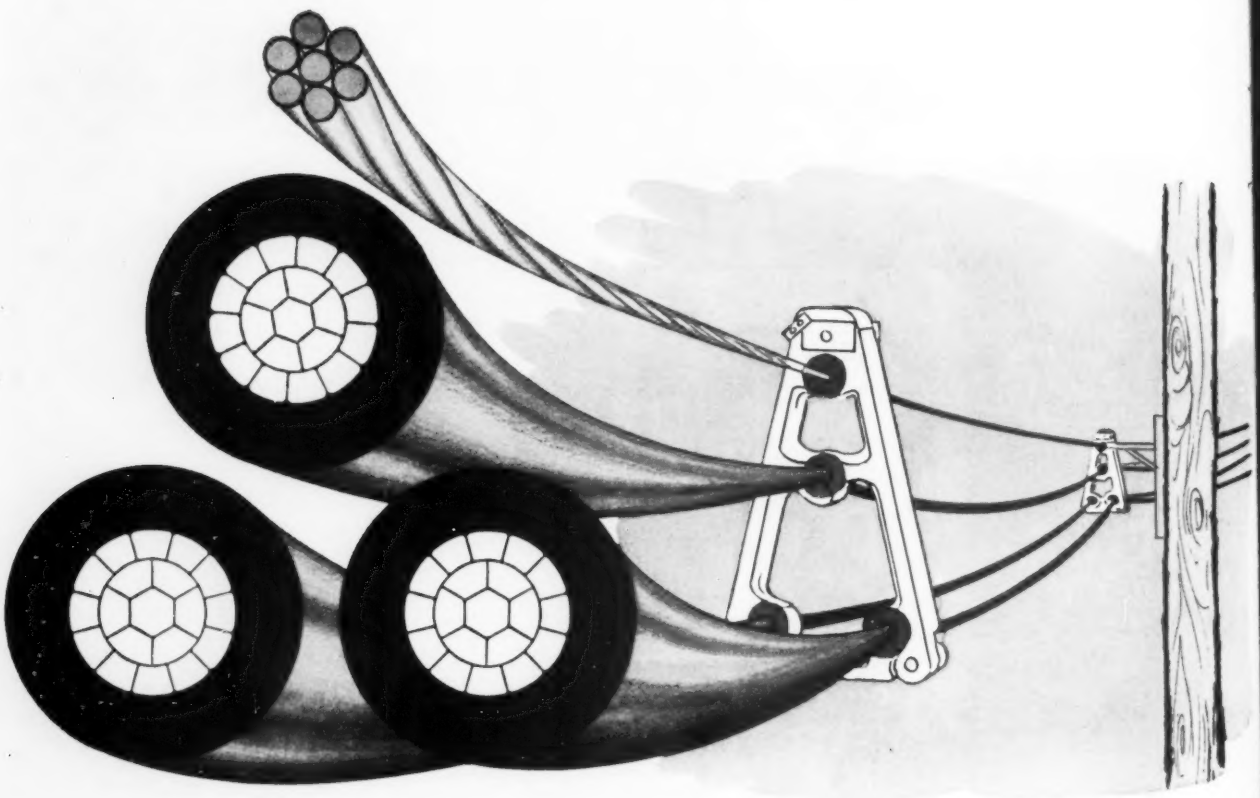
Better vacuum processing — a carefully controlled combination of heat and extremely high vacuum — means better penetration of the *Chlorextol* insulating liquid into the packs. Insulating paper losses and heating are reduced, electrical strength is gained. Thorough degassing increases voltage level at which corona starts. It all adds up to a big, built-in margin of safety for severe overvoltages and high ambient temperature . . . for *extra* years of capacitor life.

For more capacitor facts, call, wire or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin. A-1220

Chlorextol is an Allis-Chalmers trademark.



Complete capacitor equipment is available for immediate shipment—25 and 50-kvar units—2400 through 7960 volts. Includes racks, voltage and current controls, other accessories.



ADVANTAGES OF COMPRESTO CABLES

C OMPRESTO aerial cable is the lightest, most compact stranded conductor available today.

O PERATION through storms and ice conditions greatly improved.

M ORE economical than fully insulated aerial cables.

P HASE identification is positive and simple.

R EACTANCE is less, thus more improved voltage regulation.

E ASY to install.

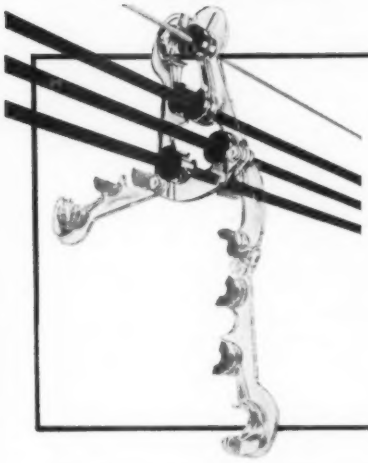
S AME ampere rating as with open wire construction.

T APS and transformers may be added with little difficulty.

O FFERS improved resistance to compression cutting of the covering.

Write for brochure on Aerial Cables

Compresto® NOW AVAILABLE AS SPACED AERIAL CABLES



THE ULTIMATE IN A *COMPACT* SYSTEM CAN NOW BE ACHIEVED BY COMBINING Compresto CABLES WITH **PLM's** NEW "WRAPAROUND" **5KV** SPACERS

FOR **15KV** SPACED AERIAL CABLE SYSTEMS USE **Southern Electrical's** Compresto CABLES AND **PLM's** NEW HIGH **ALUMINA** "WRAPAROUND" "LIFETIME" SPACERS

Southern Electrical Company

OLIN MATHIESON • METALS DIVISION • CHATTANOOGA, TENNESSEE

See Edward R. Murrow on "Small World" every Sunday evening, CBS-TV.

OLIN ALUMINUM

Lightning protection

(Continued from page 70)

several months later, and we have been using this link for approximately eight years. Our transformer fuse blowing reports now indicate that lightning is no longer the major cause of transformer fuse failures.

Service restorers

We have used service restorers very extensively from the very first introduction and performed field tests for the various manufacturers prior to the time some of these had short circuit laboratory equipment available. This is one piece of equipment we could hardly do without today. Service restorers are used in conjunction with lateral fuses throughout all sections of the system.

Double circuit shielding

We have a design for double circuit distribution line construction which is detailed in Figures 5 and 6. This construction uses three 8 ft. arms with wood braces and maintains the same BIL (500 kv) as is obtained with the single circuit design. Lightning performance of this design, therefore, can be expected to be the same except for a theoretical increase due to the 10 ft. taller pole brought about by the extra arms.

On several circuits of this type we have employed "stand-off" supports for the ground wire lead, which gives approximately 300 to 400 kv additional BIL by virtue of increased wood distance. This is probably justified only where tower footing resistances are above 50 ohms.

One variation to the double circuit design uses two 10 ft. arms with wood braces, and only a 5 ft. higher pole is required. The cost comparison between the two designs is practically a "toss-up."

Industrial circuit shielding

A fourth general design which is used, primarily for heavy industrial 13,800 volt circuits or for 34.5 kv operation, is shown in Figures 7 and 8. Large angle structures are similar to those detailed in Figure 4 except that five 10-inch discs are used. This design has a BIL of approximately 700 kv which gives a calculated lightning outage expectancy in the order of .77 per 100 miles per year, which is about half of that for the more commonly used design.

There are several factors that influenced the selection of this design for short heavy industrial feeders, these are:

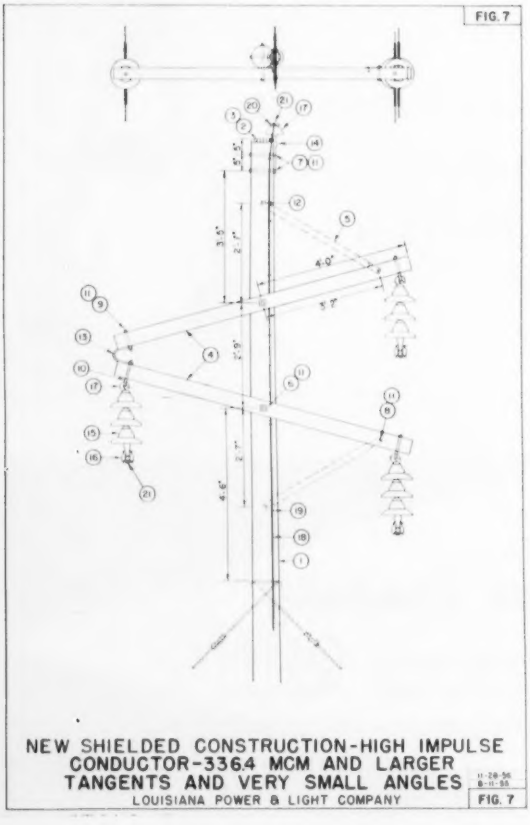
(a) The suspension disc type insulators in multiple prevent a single insulator failure from causing a circuit lock-out unless, of course, the insulator fails mechanically, which is very unusual for a disc type insulator.

(b) Most industrial plants have some degree of atmospheric contamination and the extra leakage distance provided by the three 10-inch discs is advantageous in such cases.

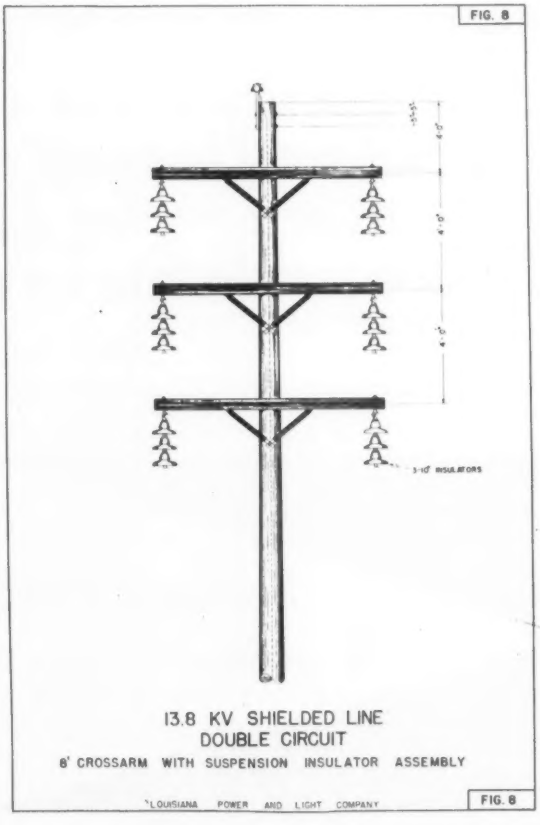
(c) The conductor sizes for circuit loading up to 25,000 kv are more easily handled with suspension clamps.

For 34.5 kv operation the three insulators in suspension are required for normal leakage considerations.

(A second article concluding this discussion will appear next month.)



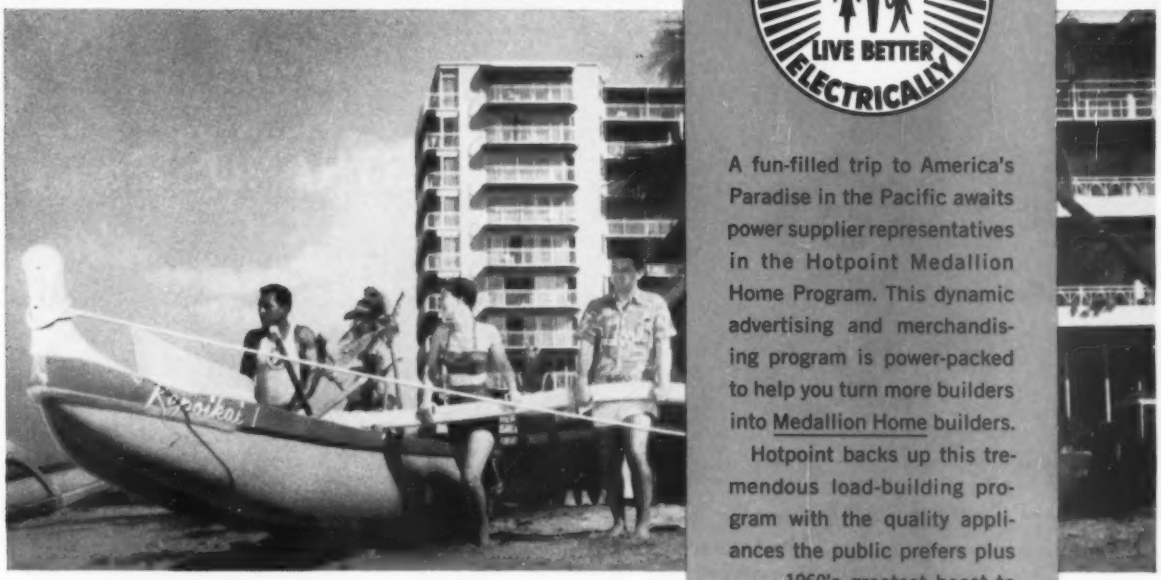
NEW SHIELDED CONSTRUCTION-HIGH IMPULSE
CONDUCTOR-3364 MCM AND LARGER
TANGENTS AND VERY SMALL ANGLES
LOUISIANA POWER & LIGHT COMPANY
FIG. 7



13.8 KV SHIELDED LINE
DOUBLE CIRCUIT
8' CROSSARM WITH SUSPENSION INSULATOR ASSEMBLY
LOUISIANA POWER AND LIGHT COMPANY
FIG. 8

WIN A HAWAIIAN HOLIDAY

in the **HOTPOINT**
MEDALLION HOME PROGRAM



MEDALLION HOME ® LIVE BETTER ELECTRICALLY

A fun-filled trip to America's Paradise in the Pacific awaits power supplier representatives in the Hotpoint Medallion Home Program. This dynamic advertising and merchandising program is power-packed to help you turn more builders into Medallion Home builders.

Hotpoint backs up this tremendous load-building program with the quality appliances the public prefers plus . . . . 1960's greatest boost to all-electric living . . .

NEW
HOTPOINT ELECTRIC BASEBOARD HEATING
WITH CALROD® HEATING UNITS

Hotpoint offers the load-building benefits of electric heating – clean, safe, comfortable, convenient, economical – plus the proven performance of famous Calrod heating units. Call your Hotpoint distributor today for complete details on new Electric Baseboard Heating, the Hotpoint Medallion Home Program, and your Hawaiian Holiday.

Hotpoint

A Division of General Electric Company, Chicago 44, Illinois

ELECTRIC RANGES • REFRIGERATORS • AUTOMATIC WASHERS • CLOTHES DRYERS • CUSTOMLINE® • DISHWASHERS
DISPOSALLS® • WATER HEATERS • FOOD FREEZERS • AIR CONDITIONERS • ELECTRIC BASEBOARD HEATING

When **M** STRANDS go up

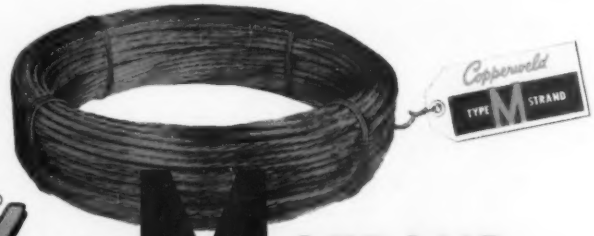
your costs come down

It's true economy to install guys and messengers made of Copperweld Type M Strand. There are no maintenance costs—no replacement costs. Because Type M Strand is non-rusting, you eliminate, once and for all, the problems and expense caused by the deterioration and failure of rust-weakened guys and messengers.

Type M Strand gives you the same long life and freedom from maintenance that has distinguished Copperweld Products for over 40 years. Each wire is permanently protected against corrosion by a heavy copper sheath inseparably molten-welded to an alloy steel core. And, because of the molten-weld, the copper will not crack, flake or peel. Easy to handle—easy to install—Type M Strand can be readily bent, served, moused or clamped.

You can see that Type M Strand offers economies you can't afford to pass up. Put this strand up and prove it for yourself.

COPPERWELD STEEL COMPANY
WIRE AND CABLE DIVISION **Glassport, Pa.**
For Export: COPPERWELD STEEL INTERNATIONAL COMPANY, New York



Copperweld® **TYPE M™ STRAND**

FOR GUYS AND MESSENGERS

Notes on new utility equipment

Switchgear line features fused load interrupter

A NEW LINE of high-voltage fused load interrupter metalclad switchgear rated as high as 44,500 amperes fault-closing and 500 mva shortcircuit interrupting at 14.4 kv has been introduced by S&C Electric Co., 4435 Ravenwood Ave., Chicago 40, Ill. Corresponding ratings at 4.16 kv are 60,000 amperes fault-closing and 250 mva short-circuit interrupting.

Closing on 44,500 ampere faults is made possible by a new load interrupter with an integral quick-make, quick-break device for high-speed closing. Closing action is sequenced so that the circuit is made on separate arcing contacts before the load-carrying contacts close.

Interrupting duty to 500 mva is provided by a new solid-material boric-acid power fuse. New multiple-bore construction permits the fuse to handle low, medium, and high faults. An expellable boric acid liner automatically enlarges the fuse bore to handle the heaviest faults.

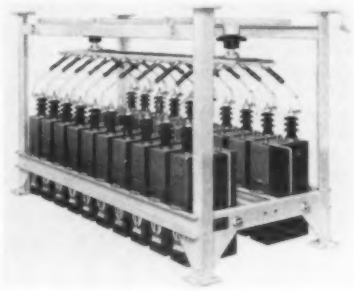
This new line of S&C switchgear offers important savings compared to other forms of switchgear for high-voltage power distribution in industrial plants, institutions, and commercial buildings. It is available in ratings from 4.8 kv through 14.4 kv. Generally applied as switching centers and service entrance equipment, this S&C switchgear is available in continuous ratings of 200, 400, and 600 amperes fused. Ratings as high as 1200 amperes are available unfused.

S&C metalclad switchgear meets all pertinent requirements of the new National Electrical Code. Published ratings on ability to carry, to close, and to interrupt all currents up to the assigned maximum short-circuit rating of the integrated fused load interrupter and enclosure were established after extensive testing.

Write U-201 on reply card, pg. 17

Aluminum capacitor racks made to resist corrosion

NEW ALUMINUM capacitor racks, available from the Ohio Brass Co., 310 N. Main St., Mansfield, Ohio, are made to resist corrosion and eliminate future maintenance costs. O-B's units are light weight and factory



assembled. They include both stacking racks for substation installations, and in-line and twin-line racks for pole-mounted equipment.

The 6061-T6 aluminum equipments provide excellent protection against all corrosive elements. These racks are also 35 to 50 per cent lighter than their steel counterparts. High speed jig welding makes strong and neat joints that resist distortion to the structures during handling and shipment.

Write U-202 on reply card, pg. 17

Single-phase regulator is lighter, smaller

LIGHTER WEIGHT and reduced size are among the major user benefits of the completely redesigned line of single-phase JFR regulators introduced today by Allis-Chalmers. Their new line of ⅝ per cent step regulators is the result of three years of research and development work.

Weight of the new unit is up to 40 per cent less while the height is reduced as much as 30 per cent. Technical advances and increased quality of materials makes this progress possible.

Contributing to the unit's reduced weight are the newly designed wound core, preventive autotransformer, potential and current transformers and rearrangement of inter-

nal connections to obtain better space factor.

Adding to the operating convenience is a redesigned position indicator with an electrical reset of the drag hands. The position indicator is mounted below the cover for increased operator safety.

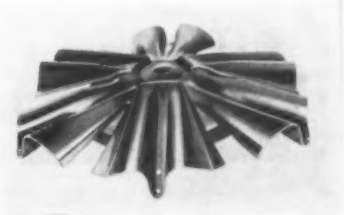
Other features of the new units include oilsight gauge; 100 per cent unit construction with internal clamping of bushings; terminals adaptable to either aluminum or copper conductors; and horizontal bypass arrestor mounted on the outside of the regulator for quick visual inspection.

Write U-203 on reply card, pg. 17

Six-way expanding anchor exerts 20,000-pound hold

A SIX-WAY expanding anchor, available from Line Material Industries, 700 W. Michigan, Milwaukee 1, Wis., has a rated holding power of twenty thousand pounds.

The anchor is a two-piece, pressed



steel design, with broad, fluted blades made from a single piece of steel. Having an expanded area of 200 square inches, the anchor utilizes a one-inch rod.

The anchor, which is coated with a black asphaltum paint, has an un-

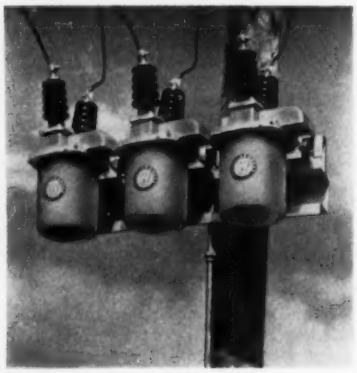
expanded diameter of ten inches. Anchor rod recovery is provided by a nut retainer at the anchor's base.

Write U-204 on reply card, pg. 17

Distribution oil switch shows fast response

A NEW 200-AMPERE, 15-kv oil switch (type CSL) has been introduced by Westinghouse Electric Corp. P. O. Box 2099, Pittsburgh 30, Pa., for pole-mounted capacitors, sportsfield and street lighting, and as a load-break isolating switches on rural and suburban distribution systems.

The new oil switch is solenoid-operated and requires only 2 cycles to open and 6 to reclose. This fast response insures simultaneous operation of all three switches on a 3-phase capacitor bank and prevents neutral shift with resulting high voltage to ground.



During closing, initial contact is made on the tips of contact fingers, which are wiped clean as closing is completed, minimizing resistance. When the switch is fully closed, the current path is through contact surfaces never exposed to a strike. Contact speed is a minimum of 10 ft/sec to help avoid reignition and restrike during capacitor switching.

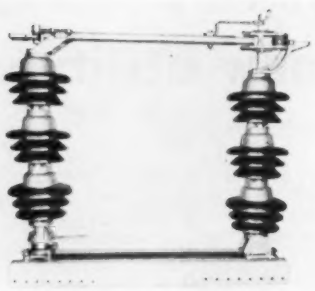
Control contacts are mounted above the oil, eliminating oil carbonization and reducing maintenance.

The 200-ampere, 15-kv switch has a 95-kv BIL level, a momentary current rating of 9000 amperes, RMS asymmetrical and a one-second rating of 6000 amperes, RMS symmetrical. Control voltage is 120 or 240 volts.

Write U-205 on reply card, pg. 17

High-voltage power switches for outdoor group operation

HIGH-VOLTAGE POWER switches in PH10 series of horizontal switches extend the line of power switches of Line Material Industries, 700 W. Michigan, Milwaukee 1, Wis.



Type PH10 switches are available now for outdoor group operation in horizontal, vertical, and inverted mounting positions. With a momentary rating of 20,000 and 40,000 amperes, the switches have a continuous current rating of 600 and 1,200 amperes at voltages of 69, 115, 138, and 161 kv.

The new switches feature ease of operation and positive action under adverse conditions for sectionalizing, disconnecting, and bypassing applications. Special feature of switch line is the swivel contact with an internal pressure release system.

Other features include permanent lubrication, individual aligned insulator stacks, universal mounting base, and flexible interphase mechanism.

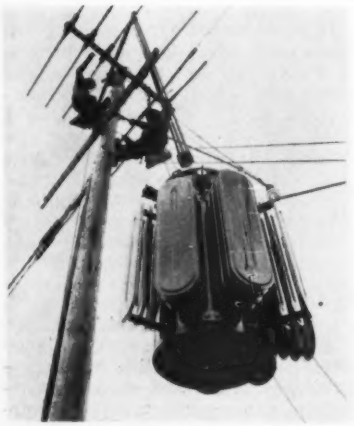
Write U-206 on reply card, pg. 17

Light-weight transformers eliminate many tank extras

A NEW, COMPLETE line of large distribution transformers through 500 kva has been announced by General Electric's Distribution Transformer Department, Schenectady 5, N. Y.

The single-phase 333 and 500 kva, and the three-phase 225, 300 and 500 kva distribution transformers replace present station-type construction through 15 kv.

The newer, light-weight units eliminate various tank accessories such as drain valves, liquid level gages, and thermometers which were formerly standard on station-type units. It was developed to fill the industry's growing need for transformers that step down to utilization voltages such as 240/480.



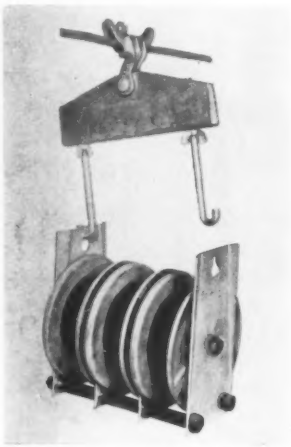
The new, large distribution transformer line is now available in single-phase ratings of 250,- 333-, and 500 kva, and in three-phase ratings of 225-, 300-, and 500 kva with primary voltages through 15 kv.

Write U-207 on reply card, pg. 17

Multi-blocks aid stringing of multi-aerial cable systems

A NEW MULTI-BLOCK, which mounts three 8 x 2-inch sheaves on one heavy yoke is now being offered by the Distribution and High-Line Specialities Co., 2100 Del Norte, St. Louis 17, Mo.

The sheaves on this multi-block feature 3/8-inch replaceable bottom groove liners, permitting single "bull-line" stringing of two or three cables in one pull operation.



Blocks can be mounted at pole on the messenger with B.T.C. angle clamp, or clevis fittings into yoke to fasten on pole support brackets. Spacers mounted first at blocks will capture proper sag, which can then be easily divided between additional spacers needed in span.

Also available from the same company is a spacing type multi-block-span, on which a delta configuration of non-metallic spools, mounted on RT bearings, gives proper positioning and near conductor spacing of 9 kv and 15 kv systems.

Write U-208 on reply card, pg. 17

Four-way expanding anchors penetrate firm earth base

A COMPLETE line of 4-way expanding anchors as well as a complete line of gray-iron cone anchors have recently been announced by Penn-

DEPENDABLE, HIGH EFFICIENCY TESTED LIGHTING

FOR BUSINESS THOROUGHFARES, SHOPPING CENTERS, HIGHWAYS, TURNPIKE INTERCHANGES, ETC.

PEMCO METROPOLITAN FLUORESCENT LUMINAIRE

STYLE 72

Metropolitan Style 72 is the first of a series of new Pemco Fluorescent Luminaires. Cat. No. 72-804 is for use with four 72" 800 MA lamps, Cat. No. 72-154 for four 72" 1500 MA lamps.

Housing is of one-piece moulded gray fibreglas — no painted surface to fade or peel. Pemco's specular reflector assures maximum utilization of light output and proper direction of light. One-piece moulded heat-resistant clear acrylic enclosure eliminates possibility of cracks from cemented joints. Luminaire is rigidly reinforced throughout. Request Bulletin 125 for complete information on the Pemco Metropolitan Style 72 Fluorescent Luminaire.

COMING SOON

PEMCO METROPOLITAN FLUORESCENT LUMINAIRE — Style 72 — for two 72" 1500 MA or two 72" 800 MA lamps, and

PEMCO METROPOLITAN FLUORESCENT LUMINAIRE — Style 48 — for two 48" 1500 MA or two 48" 800 MA lamps.

PEMCO LIGHTING HAS BEEN QUALITY LIGHTING SINCE 1882

PHILADELPHIA ELECTRICAL & MANUFACTURING COMPANY

1200-36 N. 31st Street • Philadelphia 21, Pa. • P. O. Box 8359

Pemco

Union Electric Corp., 315 State St., Erie, Pa.

The EEA expanding earth anchor features 4 extra-long blades which are heavily flanged for high rigidity and tremendous penetration into undisturbed earth. The curvature and size of the spear pointed blades not only achieve higher holding power by

having greater area in undisturbed earth but also aid installation by its high cutting action.

The anchor base incorporates specially designed indentations to assure proper guiding and nesting of the V-Way blades when expanded. A nut retainer is welded to the base for ease of installation and retrieving the rod.

These anchors are available in eight different square-inch sizes and in two different base sizes—8" and 10". They are specially coated to protect them from long periods in damp storage areas and against corrosive soil conditions.

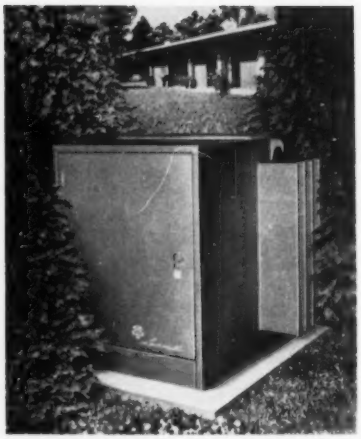
The CEA type cone anchor line is cast from gray iron and has its own cast-in nut retainer plus a special rippled horizontal ribs cast in the cone surface to increase holding strength. It is available in the 8", 10", 12", 16", 19" and 26" diameter and is also specially coated with a special asphalt compound for corrosive soil conditions.

Write U-209 on reply card, pg. 17

Surface transformer for underground distribution

DEVELOPMENT of a complete line of compartmented distribution transformers for ground-level installation has been announced by Pennsylvania Transformer Div. McGraw-Edison Co. Box 330 Canonsburg, Pa. Officially labeled "Lawn-master Pole Star Transformers," the new units utilize the same core-and-coil assembly as other transformers in the Pole Star distribution line. Both single-phase and three-phase ratings are available.

According to the company, Lawn-



master Pole Star transformers are designed for service on underground distribution systems. Installation costs for the ground-level units are said to be substantially less than for transformers placed in underground vaults.

Low in height and therefore easily screened by shrubbery and small trees, the transformers are particularly recommended for suburban residential areas, shopping centers and industrial plants. No separate enclosures are required, as Lawn-master Pole Star Transformers are completely self-contained and include a securely locked compartment door for protection of the public and company personnel. Compartments are completely weatherproof.

Available ratings include 25 through 167 kva, single phase, and 75 through 500 kva, three phase, in all standard voltages through 15 kv. Completely self-protected units are available through 100 kva, single phase. Optional equipment includes transfer switches, standoff insulators and lightning arrester mounting brackets.

Write U-210 on reply card, pg. 17

Leg design steadies hydraulic derrick

RECTANGULAR SIDE LEGS and an extra-long middle leg hydraulic cylinder are two of the outstanding features of the new Series 3750 hydraulic derrick manufactured by Holan Corp. 4100 west 150th St., Cleveland 35, Ohio.

The Holan 3750 is engineered to withstand abuse in the field. The new rectangular side legs, fabricated from long-lasting, rust-resisting, high tensile steel, are stronger than the tubular side legs used on the Series 3700—an earlier Holan model with much service in the field. A sturdy cross support between the derrick legs adds strength and rigidity.

A longer middle leg hydraulic cylinder allows the derrick head to come closer to the ground for forcing the digger deeper into the soil than was possible with the Series 3700. The integral middle leg with live boom action provides extra power for butt-pulling, body loading transformers, cable reels or other equipment weighing as much as 5,000 pounds, and forcing diggers into hard-frozen, rocky soil. Proof-of-strength is its ability to remove an auger filled with dirt.

The 3750 is a 12,000-pound capacity derrick, capable of setting poles 75 feet in length. But it has actually been tested at 22,000 pounds.

One man can raise the derrick in 35 seconds, stow it in position in 40 seconds. A super-sensitive hydraulic system with a pump driven by power take-off controls every movement of the machine.

The 3750 has a working range of 195°. It swings from its over-the-cab storage position to within 5 feet of the ground for easy threading of the winch line.

Write U-211 on reply card, pg. 17

Rotating standards tester offers new speed, accuracy

THE UNILOAD rotating standard testing equipment now being built by Knopp, Inc., 1307 66th St., Oakland 8, Calif., offers new speed, ease of operation, and high accuracy in testing portable standard watthour meters, according to the manufacturer.

Through the use of built-in Knopp precision multirange transformers and the Knopp Uniload system it is possible to conduct tests with high or equal accuracy on 24 current ranges and on five potential ranges while using for comparison only one single-range reference instrument or, if desired, a matched set of three. The current ranges are from .25 to 100 amperes, and the potential ranges are 120, 208, 240, 277, and 480 volts.

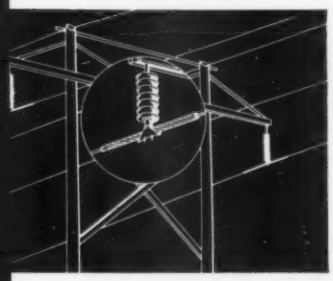
Write U-212 on reply card, pg. 17

*Superformed** means better

ACCURACY • UNIFORMITY • GRIPPING

...*for* overhead line CONSTRUCTION, PROTECTION, REPAIRS

SUPERFORMING is an exclusive patented process for helical wire forming . . . *developed* by Fanner, the earliest commercial manufacturer of machine-formed armor rods . . . *formed* by special Fanner-designed machines with unequalled accuracy, freedom from surface damage or cross-sectional distortion . . . *tested* with specially-devised equipment simulating most severe operating conditions . . . *backed* by an organization which has built on Integrity, Service and Quality . . . *SAVES MONEY* because application is fast, simple, requires no tools . . . reduces maintenance . . . extends service life of conductors. That's why *more and more utilities are using more and more Superformed Products.* A-1429A

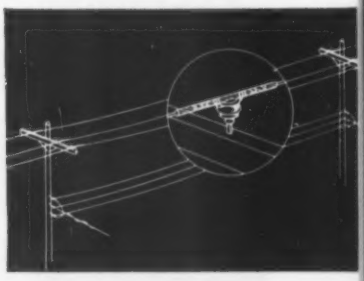


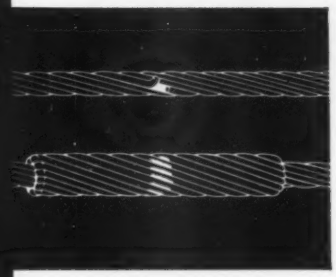
◀ ARMOR RODS

Protect against wind-induced and resonant-frequency conductor vibration at supporting points.

LINEGUARDS ▶

Protect at support points (and taps) in urban distribution where short spans are common; smaller wire sizes and shorter length than Armor Rods.



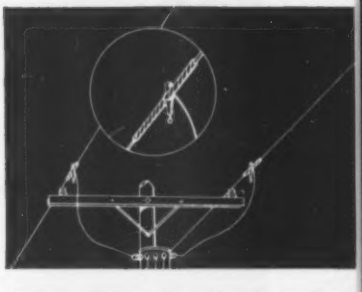


◀ PATCHRODS

Repair damaged or broken (up to 25% of strands) conductors, too far from support for Armor Rod to protect.

TAP ARMOR ▶

Protects where taps are required beyond extremities of Armor Rods on long spans or un-armored conductors.

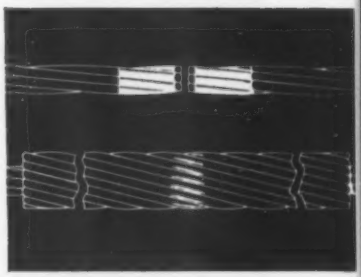


◀ FANNGRIPS

Provide ideal dead-ending and splices for wires, strands or cables for: Guys, Conductors, Multiplex Cables, Come Alongs, similar uses.

FANNSPLICES ▶

Join two ends of wire, or restore damaged conductors to original strength.



PLASTIC PRODUCTS FOR CONDUCTOR PROTECTION

Kover-Gard Ground Wire Moldings . . . Plastic Fannguards . . . Rigid and flexible Insulating Tubings. For field or factory application, wherever there is a real need for surface covering.

STOCKS . . . SERVICE

Fanner Superforms are sold and serviced nationally by 22 Manufacturers' Agents in 34 locations. Stocked by electrical distributors from coast to coast.

PACKAGING

Superformed Products go to you in pre-packaged sets . . . the correct number of rods, centermarked with identification. Also supplied in bulk.

*Trademark

Fine Fanner Superformed Products

THE FANNER MANUFACTURING CO.
Brookside Park • Cleveland 9, Ohio
Electrical Products Division

Licensed for use under or made in accordance with one or more of the following patents: Patent No. 2,587,521, 2,769,478, 2,588,663—Other patents pending.

APPLICATION DATA

Specification and ordering are made easy by Fanner Superformed Products Catalog EP-8. Contains 48 pages of Selection, Application, Installation information.

Holan Bodies for Cable Splicing

...All Made of High-Tensile Steel

Write for Holan catalogs on cable splicers and IU-76.

Holan Corporation, 4100 West 150th Street, Cleveland 35, Ohio
***Plants in* Cleveland, Ohio; Griffin, Georgia; Phoenix, Arizona**

Holan

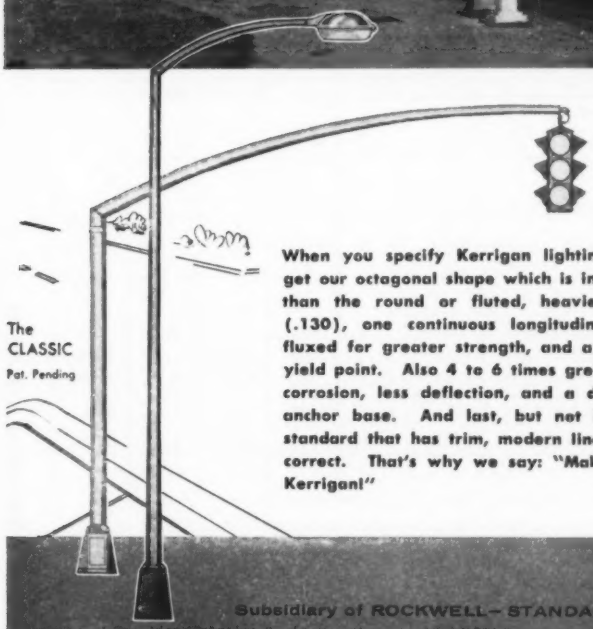
Subsidiary of THE OHIO BRASS COMPANY

HOLAN

Improve *YOUR* Street Lighting

MAKE YOUR *STANDARD*

KERRIGAN



The CLASSIC
Pat. Pending

When you specify Kerrigan lighting standards you get our octagonal shape which is inherently stronger than the round or fluted, heavier wall thickness (.130), one continuous longitudinal weld magna-fluxed for greater strength, and a guaranteed high yield point. Also 4 to 6 times greater resistance to corrosion, less deflection, and a drop forged steel anchor base. And last, but not least, you get a standard that has trim, modern lines, architecturally correct. That's why we say: "Make Your Standard Kerrigan!"

Our new 70-page catalog has the engineering facts on both steel and aluminum standards! Won't you write for your FREE copy now? Address: Dep't. ES-2

KERRIGAN
IRON WORKS COMPANY
Nashville, Tennessee

Subsidiary of ROCKWELL–STANDARD Corporation

New series of tables extended to include larger hourly rates

A NEW SERIES of estimating tables, completely revised in the light of more recent jobs and experience, are presented in this issue and will appear from month to month in forthcoming issues. These electrical estimating data sheets cover labor only and are arranged alphabetically with the basic material headings as a title for each tabulation.

Labor units given in these tabulations are based on a minimum of interference during work progress. The averages listed do not provide for abnormal job conditions, and any such abnormal conditions will require adjustments by the user, based on his experience.

The work units covered by each table are composed of one or more separate but closely related operations necessary for the complete installation of a particular basic item of electrical equipment. These operations associated with the basic material are described at the bottom of each table.

Most of the electrical estimating tabulations follow the same form. Column 1 at the left shows the size of the material to be installed. The second column from the left gives the time required to install the material, and it should be noted especially that this "productivity" column may be based on individual units or in the case of cable or conduit on units of 100 feet or 1,000 feet. The abbreviations "Ea." for each, "C" for hundreds, and "M" for thousands in Column 2 indicate the basis of the labor hours.

Columns 3 to 13, from the left, give the actual labor costs in dollars per unit of installation, at various hourly wage rates.

When calculations are being made for an hourly wage rate that doesn't correspond to any of the rates listed in Columns 3 to 13, the user may multiply the number of hours in Column 2 by 100 and this will give the labor cost based on an hourly wage rate of $1 per hour. By multiplying this by the hourly wage rate that actually applies in the user's locality, the exact labor cost of the operation may be obtained. Labor costs obtained in this way will be for units, hundreds of feet, etc., as given in heading of Column 2 of the table.

The labor units covered by the tables represent direct job labor costs and do not include delivery of material to site, engineering, estimating, or any other indirect cost.

As will be noted, some of the electrical estimating tabulations to be given will be for independent operations, such as excavating, backfilling, etc. These are included for use in preparing estimates on work of a special nature not covered under a specific table heading.

Tables will appear in alphabetical order.

DEAD END CIRCUIT BREAKING PLUGS AND RECEPTACLES
BASE MOUNTING (ONLY)
WOOD AND MASONRY
60 AMP - 4 WIRE

575 Volt AC
HOUSING COVER OPTIONAL

SIZE WIRE	SIZE POLE	SIZE HUB	HOURS PER EA.	LABOR COST INSTALLED PER EA. @ FOLLOWING RATES $2.00	$2.25	$2.50	$2.75	$3.00	$3.25	$3.50	$3.75	$4.00	$4.25	$4.50
				WOOD MOUNTING (4 SHOES)										
4	4	1¼"	1.3	2.60	2.93	3.25	3.58	3.90	4.23	4.55	4.88	5.20	5.53	5.85
				CONCRETE MOUNTING (4 SHOES)										
4	4	1½"	1.5	3.00	3.38	3.75	4.13	4.50	4.88	5.25	5.63	6.00	6.38	6.75
DIA. CABLE				TYPE C.P. DEAD END PLUGS FOR ABOVE										
.625	.750		.5	1.00	1.13	1.25	1.38	1.50	1.63	1.75	1.88	2.00	2.13	2.25
.750	1.000		.65	1.30	1.46	1.63	1.79	1.95	2.11	2.28	2.44	2.60	2.76	2.93
1.000	1.188		.9	1.80	2.03	2.25	2.48	2.70	2.93	3.15	3.38	3.60	3.83	4.05
1.188	1.375		1.1	2.20	2.48	2.75	3.03	3.30	3.58	3.85	4.13	4.40	4.68	4.95

E-101-B

GROUNDING THROUGH SHELL ONLY.
LABOR: INCLUDES DISSASEMBLY, DRILLING & ANCHORING, SECURING, MAKING TAPS & REASSEMBLY

2-60

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250 VOLT DC - 440 V AC
HOUSING COVER OPTIONAL

DEAD END CIRCUIT BREAKING PLUGS & RECEPTACLES
BASE MOUNTING (ONLY) WOOD & MASONRY
100 AMP -- 3 WIRE

SIZE WIRE	POLE	HUB	HOURS PER EA.	LABOR COST INSTALLED PER EA.@ FOLLOWING RATES $2.00	$2.25	$2.50	$2.75	$3.00	$3.25	$3.50	$3.75	$4.00	$4.25	$4.50
				WOOD MOUNTING (4 SHOES)										
3	3	1¼"	.95	1.90	2.14	2.38	2.61	2.85	3.09	3.33	3.56	3.80	4.04	4.28
3	3	1½"	1.1	2.20	2.48	2.75	3.03	3.30	3.58	3.85	4.13	4.40	4.68	4.95
				CONCRETE MOUNTING (4 SHOES)										
3	3	1¼"	1.2	2.40	2.70	3.00	3.30	3.60	3.90	4.20	4.50	4.80	5.10	5.40
3	3	1½"	1.35	2.70	3.04	3.38	3.71	4.05	4.39	4.73	5.06	5.40	5.74	6.08
DIA.		CABLE		TYPE C. P. PLUGS FOR ABOVE (DEAD END)										
.500		.750	.45	.90	1.01	1.13	1.24	1.35	1.46	1.58	1.69	1.80	1.91	2.03
.750		1.000	.65	1.30	1.46	1.63	1.79	1.95	2.11	2.28	2.44	2.60	2.76	2.93
1.000		1.375	1.0	2.00	2.25	2.50	2.75	3.00	3.25	3.50	3.75	4.00	4.25	4.50
1.375		1.875	1.3	2.60	2.93	3.25	3.58	3.90	4.23	4.55	4.88	5.20	5.53	5.85

E-101-B

GROUNDING OPTIONAL THROUGH SHELL OR SHELL & EXTRA POLE.
LABOR: INCLUDES DISSASEMBLY, DRILLING & ANCHORING AS REQUIRED, SECURING, MAKING CONNECTIONS AND REASSEMBLY.

2-60

250 V DC
440 V AC Housg Cov Opt.

DEAD END CIRUIT BREAKING PLUGS & RECEPTACLES
BASE MOUNTING (ONLY)
100 AMP -- 4 WIRE

SIZE WIRE	POLE	HUB	HOURS PER EA.	LABOR COST INSTALLED PER EA. @ FOLLOWING RATES $2.00	$2.25	$2.50	$2.75	$3.00	$3.25	$3.50	$3.75	$4.00	$4.25	$4.50
				WOOD MOUNTING (4 SHOES)										
4	4-5	1¼"	1.4	2.80	3.15	3.50	3.85	4.20	4.55	4.90	5.25	5.60	5.95	6.30
4	4-5	2"	1.5	3.00	3.38	3.75	4.13	4.50	4.88	5.25	5.63	6.00	6.38	6.75
				CONCRETE MOUNTING (4 SHOES)										
4	4-5	1¼"	1.6	3.20	3.60	4.00	4.40	4.80	5.20	5.60	6.00	6.40	6.80	7.20
4	4-5	2"	1.75	3.50	3.94	4.38	4.81	5.25	5.69	6.13	6.56	7.00	7.44	7.88
DIA		CABLE		DEAD END PLUGS FOR ABOVE TYPE C.P.										
.500		.750	.5	1.00	1.13	1.25	1.38	1.50	1.63	1.75	1.88	2.00	2.13	2.25
.750		1.000	.65	1.30	1.46	1.63	1.79	1.95	2.11	2.28	2.44	2.60	2.76	2.93
1.000		1.375	.9	1.80	2.03	2.25	2.48	2.70	2.93	3.15	3.38	3.60	3.83	4.05
			1.3	2.60	2.93	3.25	3.58	3.90	4.23	4.55	4.88	5.20	5.53	5.85

E-101-B

GROUNDING THROUGH SHELL ONLY
LABOR INCLUDES DISSASEMBLY, DRILLING & ANCHORING, SECURING, MAKING CONNECTIONS AND RE-ASSEMBLY.

2-60

Electrical Estimating—III

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Know the law

by Arthur L. H. Street

Licensing ordinance judicially junked

◆ WHERE AN ORDINANCE requiring payment of a license fee limited the right of an electrical contractor holding a state license to contract in the city unless he paid the city the prescribed fee and obtained a permit from the city, the requirement for payment of the fee and obtaining of a permit nullified permission given contractor by state law to conduct his business at any place in the state, and penal provisions of the ordinance were therefore void. The California District Court of Appeal, Second District (Los Angeles) so decided November 3, 1958, in the case of Agnew v. Culver City, 331 Pac. 2d 201.

Facts of the case

Plaintiff, a nonresident of Culver City, is an electrical contractor licensed by the Contractors' State License Board. He applied to the proper official for a permit authorizing him to do electrical work within Culver City at a designated address. He was informed it would be necessary for him to pay a license fee of $100 under the ordinance and to obtain from the business license collector a business license to do work as an electrical contractor in the city. Plaintiff refused to pay the fee and to obtain the license on the ground that his state license as electrical contractor authorized him to do work as such in Culver City without conforming to any local ordinances requiring a license or the payment of a fee.

Ordinance 49, as amended, makes it unlawful for any person to commence or carry on any business specified in the ordinance without first having paid the required license fee and having procured a license certificate so to do from the city and without obtaining the permit, certificate of compliance, or other instrument required by the ordinance.

The license fee required was $50 a year, or part thereof, from *local* and $100 a year, or part thereof, from *itinerant* electricians and electrical contractors. The amount of the license fee is made a debt to Culver City. Violation of any provision of the ordinance is a misdemeanor. On payment of the required fee it is made the duty of the license collector to issue a license certificate.

Court's decision

Principal passages of court's opinion are as follows: "In the recent case of Agnew v. City of Los Angeles, 51 Cal. 2d---, 330 P.2d 385, the Supreme Court held that a section of the Electrical Code of the City of Los Angeles which provided that 'In order to obtain a license tax registration certificate number, the contractor must pay the city clerk a fee based on the amount of his gross receipts' and made it a misdemeanor for an electrical contractor to install wiring without a permit from the Department of Building and Safety of the city was invalid for the reason that it was in conflict with the Contractors' License Act***which has preempted the field of regulating contractors.

"The license fee required by the Culver City ordinance is of the same character as that held invalid in Agnew v. City of Los Angeles, 51 Cal. 2d---, 330 P.2d 385. As said on the prior appeal in this case, it limits the right of a contractor holding a state license to contract in Culver City unless he pays the city the prescribed fee and obtains a permit from the city; the requirement for the payment of a fee and the obtaining of a permit nullifies the permission given a contractor by the general law to conduct his business at any place in the state.

"And in the Los Angeles case it is said (51 Cal. 2d at page ---, 330 P.2d at page 388): The only material difference between the ordinance held invalid in Agnew v. City of Culver City, supra (147 Cal. App. 2d 144, 304, P.2d 788), and the ordinance here involved is that the former imposed a fee of $100, while in this case the fee varies according to the amount of the contractor's gross receipts the minimum being $12."

Contractor's dealings with lessee of premises

◆ WHEN AN ELECTRICAL contractor is called upon by the lessee of premises—for example, the operator of a restaurant—to make installations that are to be affixed to the building occupied by him, it behooves the contractor to know to just what extent he may be able to enforce a lien against the premises.

Angles of this subject were considered by the Oklahoma Supreme Court in a case that is in point because of the similarity, for legal purposes, between contracts to install electric wiring and contracts to install plumbing. (Black v. Hoshall's Plumbing Co.)

Gist of the decision, as affected by Oklahoma statutes:

A mechanic's and materialman's lien for material and labor furnished under contract with lessee of realty, extends to entire interest of lessee in all leased premises.

If particular item is affixed to pre-existing building by materialman under contract with lessee in such manner as to become an integral part of the realty, and is therefore not removable by lessee, mechanic's and materialman's lien does not attach to such item, since the lessee has no interest therein.

The lien of a mechanic or a materialman against a leasehold estate does not extend to articles of purely personal property which are in no manner affixed to the realty.

Lien of one furnishing material and labor to lessee for alteration or repair of leased premises extends to trade fixtures.

Where plumbing company, which, under oral agreement with lessees, furnished material and labor for installation of plumbing fixtures on leased premises, asserted mechanic's and materialman's lien on entire freehold estate without specifically claiming a lien on leasehold estate, and company failed to prove right to lien on real estate, but did prove right to lien on leasehold, court could properly allow lien as to leasehold estate.

News of the industry

edited for Southern readers

Medallion franchise for 20 rural co-ops

TWENTY RURAL electric cooperatives, representing approximately 200,000 member consumers in Kentucky, received their franchise to issue the Gold Medallion on a unified standard. Laurance Messick, director of NEMA's business development, presented the franchises at a special luncheon meeting held in Louisville on December 15.

More than 50 representatives from all segments of the building trade were present for the meeting. The program, centered around the theme of "How the Medallion Home Program will Affect our Segment of the Industry," was presented by an architect, wholesale electric distributor, wiring contractor, manufacturer's representative, and the president of the Kentucky Home Builders Association.

The franchises were accepted on behalf of the cooperatives by J. B. Galloway, manager of Farmers RECC.

Mr. Messick pointed out that the award represented the largest single franchising on a unified basis in the history of the Medallion Home Program and marked the first award made since the Medallion Program has come under the direction of NEMA.

J. B. Galloway, left, manager of Farmers RECC, Glasgow, Ky., receives Medallion franchise from NEMA's Laurance Messick on behalf of the twenty cooperatives he represents.

Arkansas court rule favors power company

THE ARKANSAS Supreme Court has ruled five to two that the Arkansas Highway Commission must pay Arkansas Power and Light Company for removing poles and power lines from the right of way used for the relocation of U. S. Highway 167 east of El Dorado.

The Supreme Court majority opinion upheld Union County Circuit Court. Both courts ruled that the Highway Commission has the right to require removal of utility lines from roads and streets to prevent interference with such highway work but that it must award "just compensation" for this.

The Highway Commission had contended that under the state's police powers it had the right to require removal of the utility facilities without paying compensation.

The case involved 52 poles which the Highway Commission required the power company to remove and relocate from the path of the El Dorado Bypass (Highway 167) just east of the city. The Commission agreed to compensate the company for moving 25 poles located on company right of way but denied liability for the expense of relocating 27 poles originally located on public streets, county roads, platted streets in a rural area, and state highways.

Dallas Electric Club elects 1960 officers

H. M. WALNE, advertising director of the Dallas Power and Light Co., has been elected president of the Dallas Electric Club at their annual year-end meeting and election of officers.

Elected first vice-president was E. C. Wise, manager of distributor equipment sales for the General Electric Co., Dallas; L. A. Byron, vice-president of the Texas Power and Light Co., was elected second vice-president.

Re-elected secretary of the club was Walter C. Blair, Texas Power and Light Co., George R. Marrs, also of TP&L, was elected treasurer.

H. A. King Graybar Electric Co.; A. R. Mozisek, Dallas Power and Light Co.; C. A. Mass, General Electric Co.; J. J. Cupples, Butler and Land, manufacturer's agents; J. C. Bibbs, Westinghouse Corp., and H. L. Medlin, Southwestern Bell Telephone Co., were elected members of the executive committee.

Manufacturers to hold exposition in South

THE "ALABAMA Electrical and Electronic Exposition," the first annual manufacturers — sponsored electrical trade show ever to be held in the South, according to officials, is slated for March 21-23 of this year in Birmingham, Ala.

The show will be held in the exhibition hall in the Birmingham City Auditorium, and invitations to exhibit have been extended to the entire electrical industry. Invitations to visit the show are being extended to electrical contractors, industries, utilities, architects, engineers, and government agencies.

Booth spaces now available include sizes 10' x 10', 10' x 5', and 5' x 5'. Each space costs approximately $50 to rent, plus a small charge for any electrical outlets required.

Officers for the event include Bill Murphy, chairman: Ed Martin, treasurer; Jim Hensser, secretary; Larry Day, advertising; C. E. Parker, entertainment; and Nelson Bryant, promotion.

Wiring bureau sets national conference

THE 16th NATIONAL Wiring Sales Conference, sponsored by the National Wiring Bureau, will be held at the Warwick Hotel in Philadelphia, February 25-26, 1960. C. W. Higbee, assistant general manager, Electrical Conductor Division, Kaiser Aluminum & Chemical Corp, and a member of the National Wiring Bureau Executive Committee, representing the National Electrical Manufacturers Association, will be chairman of the conference.

The annual conference for electrical industry personnel is dedicated to stimulating interest in and disseminating information on the sale and promotion of electric wiring, in both the residential and commercial markets.

Highlights of the conference will include: an analysis of the "Live Better Electrically," "Medallion Home," and "National Wiring Bureau 1960," programs; a discussion of the profit possibilities in the commercial-industrial electrification market; an introduction to the new "Keep Pace Electrically" program, the promotion backdrop for the entire electrical industry in the commercial electrification market; a presentation of the "Housepower Profit Clinic", Edison Electric Institute's new sales course for electrical contractors; an analysis of commercial relighting and rewiring opportunities based on the Blackwell Report; NECA's contractor development program, and presentations of successful local promotion programs by utilities, distributors, and contractors.

In addition, again this year, *Look* Magazine will award its "Oscars" for the wiring industry. A utility, a contractor, a distributor, and an electrical league or wiring bureau, will receive *Look's* award for the most outstanding wiring promotion program of the year.

Two open-forum discussions—one on commercial wiring and the other on residential wiring be held concurrently as the last session on the conference agenda.

Association chooses Kansas City officers

E. D. SHIFFLER, district manager, Major Appliance Division, General Electric Co., was recently elected president of the Electric Association of Kansas City at the group's 48th Annual Meeting and Christmas Party at Hotel President.

Shiffler succeeds R. K. Zimmerman, vice-president of Kansas City Power & Light Company.

The new president has been active in the Electric Association for a number of years, as committee chairman, director and vice-president.

Vice-presidents elected include; utilities—Henry M. Turrell, Kansas City Power & Light Co; manufacturers—W. N. Patterson, Westinghouse Electric Corp; appl. wholesalers—C. J. Allen, Frigidaire Sales Corp; contractors—George E. Trinastich, Squire Electric Co; supply wholesalers—W. B. Whaley, Graybar Electric Co; dealers—Paul W. Jenkins, Jr., Jenkins Music Co; maint. repair & serv.—Jack Launder, Independent Electric Machinery Co.; mfg. agents & reps.—Jack D. Goetze, Earl Goetze Co; radio & TV—William A. Bates, WDAF & WDAF-TV; and TV service dealers—A. I. Burnham, Country Club Elec. & Radio Co. C. M. Anderson, General Electric Co., was re-elected secretary-treasurer.

Arkansas contractors hold annual meeting

A BANQUET address by Winthrop Rockefeller, chairman of the Arkansas Industrial Development Commission, was the climax of the recent eleventh anniversary convention of the Arkansas Chapter of the National Electrical Contractors Association.

More than 200 guests attended the banquet, representing electrical manufacturers, distributors, power suppliers, contractors, architects, engineers, and others closely allied to the electrical industry in Arkansas.

The Chapter includes divisions in El Dorado, Hot Springs, Jonesboro, Texarkana, and Little Rock, Ark.

Anaconda Wire & Cable announces promotions

RICHARD B. STEINMETZ, president of Anaconda Wire and Cable Co., recently announced the following changes in the company, all of which are now in effect:

David E. Allen, vice-president—sales, has been elected to the position of executive vice-president. He succeeds Mr. Steinmetz, who was elected president last October.

William H. Benton, Jr., formerly general manager of mills, has been elected vice-president—manufacturing. Mr. Benton succeeds Vito F. Di Lustro, who will retire at the end of the year.

The appointment of two new vice-presidents was also made public by Mr. Steinmetz. They are: John L. Tindale, formerly commercial vice-president, who has been advanced to the newly-created position of vice-president—marketing and sales; and Henry V. Van Valkenburg, until now general sales manager, who has been elevated to vice-president and general sales manager.

Birmingham manager named by I-T-E

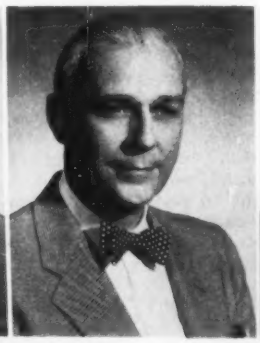
JOHN O. BROWN has been appointed manager of the new Birmingham, Ala., district office of I-T-E Circuit Breaker Co., Philadelphia.

He will handle sales in Alabama and northwestern Florida of the company's electrical products, including air and oil circuit breakers, switchgear, substations, rectifiers, panelboards, insulators, power swtching equipment, substation transformers, metal-enclosed bus, and low-voltage distribution products.

John O. Brown

Before assuming the I-T-E post, Brown was for seven years a field application engineer with Joseph W.

David E. Allen



H. V. Van Valkenburg

J. L. Tindale

Eshelman & Co., in Birmingham.

He also attended Princeton and Cornell Universities, receiving from Cornell a bachelor's degree in electrical engineering in 1945.

Appleton names six new sales managers

AN EXTENSIVE Sales Department reorganization within the Appleton Electric Company has resulted in the appointments of six new regional sales managers. This announcement was made by E. V. Aldridge, vice-president in charge of sales for the Appleton Electric Co., who reports the selection of the following six men:

E. A. McNeill has been assigned the Northeastern sales region.

Z. B. Greer, who makes his home in Birmingham, Alabama, has been

Z. B. Greer

assigned the Southeastern sales region. Mr. Greer has been part of the Appleton Sales Department since 1938.

W. G. Crum will control the East Central region covering the industrial states of Michigan, Ohio, Indiana, Pennsylvania, Kentucky and part of West Virginia. He will make his home in Detroit, Mich.

H. T. White

H. T. White has been assigned the South Central sales region. Mr. White joined Appleton Electric Company in 1938 as a sales executive

For street lighting . . . from 120 V multiple to 10,000 V series . . .

use cost-saving SUPERIOR CABLES

Thermoplastic Series Lighting Cables

- High resistance to earth acids and alkalis
- High resistance to sunlight, moisture, weather
- Small diameter, lightweight
- Easy to splice

Figure 8 Pole and Bracket Cable

- High resistance to abrasion, mechanical damage
- Does not deteriorate with age or weather
- Will not support combustion
- Flexible, strips clean, speeds installation

SUPERIOR CABLES are quality-engineered, precision manufactured and thoroughly tested.

With these plastic insulated and jacketed cables, performance and economy go hand in hand.

For low initial cost . . . for less maintenance cost . . . order SUPERIOR CABLES!

For complete information and prices, write

SUPERIOR CABLES

SUPERIOR CABLE CORPORATION

Hickory, North Carolina

3769

with a wide background of experience in the electrical field, having been associated with the industry since 1918. Mr. White resides in Kansas City and is a member of the Electric Association of Kansas City, Petroleum Electric Supply Association, Illuminating Engineers Society and vice-president of the Mid-States Electrical Manufacturers Representatives Association, Inc.

H. A. Buegel has been assigned the Western Sales District. With his new assignment he will reside in San Francisco, California.

E. A. Hakanson has been assigned the North Central region. Mr. Hakanson's territory includes Illinois, Wisconsin, Minnesota, North and South Dakota and parts of Iowa and Indiana. His home is in Skokie, Ill.

Federal Pacific makes three new appointments

THREE NEW APPOINTMENTS have been made in the marketing department of Federal Pacific Electric Co., it was announced by R. L. Bobo, vice-president-marketing for the electrical manufacturing firm.

Ralph J. Weiger has been named industrial sales manager; Armond J. Bisignani, Jr., marketing manager of the company's General Products Department; and Walter H. Niemann, marketing manager for laboratory switchboards.

Weiger as industrial sales manager will have staff responsibility for promoting all company products in the industrial market. He comes to Federal Pacific from the Cleveland district office of the Square D Co., where he directed sales in northern Ohio and western Pennsylvania.

Bisignani as General Products Department marketing manager will be responsible for negotiations and quotations involving products of more than one of the company's divisions or plants. Formerly assistant Eastern Switchgear marketing manager, he joined Federal Pacific in 1954.

Niemann as marketing manager for laboratory switchboards will be responsible for sales of this specialized product to schools, industry, government laboratories, and similar users.

Westinghouse makes promotion appointment

P. T. LAGRONE has been named assistant regional manager for Westinghouse Electric Corporation in the Southeast, it was announced recently. He was formerly manager of the company's New Orleans district apparatus division.

A native of Ansley, La., Mr. Lagrone joined Westinghouse following his graduation from Louisiana State University in 1923. From 1926 to 1947, he was with Mississippi Power and Light Company and returned to Westinghouse in 1947 as manager of the customer section, electric utility sales department.

He became electric utility manager for the company's central region in 1950 and five years later became manager of the electric utility sales department.

He moved to New Orleans as manager when the branch office there was expanded to a district operation in 1958.

Memphis manufacturer divides operations

REORGANIZATION of national sales and distribution of Light & Power Utilities Corporation products was announced this month by Murray Reiter, president. The Memphis lighting fixture manufacturer, soon to open a new plant in Olive Branch, Miss, has divided its operations geographically at the Mississippi River.

D. W. Hawkins has been named eastern sales manager and T. R. Salomon is the new western sales manager. Both men previously were sales executives with the firm.

Former sales manager, Jim Clary, has been appointed sales agent for Light & Power products in the Memphis area to increase coverage in Mid-South markets.

A. J. Bisignani, Jr. Ralph J. Weiger Walter H. Niemann

Superior Cable Corp. elects Robb president

SUPERIOR CABLE CORP., of Hickory N. C., has announced the election of James L. Robb as president of the company. He succeeds R. Walker Geitner, who has become chairman of the board of directors.

Mr. Robb, an electrical engineer and graduate of George Washington

James L. Robb

University, has been with Superior Cable Corporation since its inception.

Long associated with the communications industry, Mr. Robb worked with the Rural Electrification Administration for five years, serving as assistant chief engineer of the Telephone Engineering Division.

Raybro Electric opens Clearwater branch

M. O. HOLLIS, general manager of Raybro Electric Supplies, Inc., has announced from its headquarters office in Tampa, the opening of the company's eighth warehouse and branch office operation, at 703 Court Street, Clearwater, Fla. The branch will serve the trading area in and around Clearwater, Dunedin, Tarpon Springs, Largo, New Port Richey, Palm Harbor and Safety Harbor.

William Perez, former territory salesman associated with Raybro's St. Petersburg office, is branch manager of the Clearwater operation. His services with the parent organization have included sales work in the territories of the Tampa and St. Petersburg branches.

Mr. Perez will be assisted by Paul DeWitt, A. (Buck) Stanley, Bill Benschoter, and Bill Salzman.

Weiss to manage G-E lamp division

THE APPOINTMENT of Herman L. Weiss as general manager of the General Electric Company's lamp division, with headquarters at Nela Park, Cleveland, Ohio, was an-

nounced recently by Fred J. Borch, vice-president and group executive of the Consumer Products Group.

Mr. Weiss was formerly general manager of the large lamp department. He succeeds vice-president George E. Burens, who is being transferred to a special assignment in the company's Consumer Products Group in New York City, reporting directly to Mr. Borch.

As general manager of the Lamp Division, located at Nela Park in Cleveland, Ohio, Mr. Weiss will be responsible for the six operating departments which manufacture and distribute a complete line of light bulbs for homes, industry and commerce, as well as a line of metal parts and glass for industry, and outdoor lighting equipment.

Virginia utilities leaders take office

H. ATWOOD HITCH, vice-president, Virginia Electric and Power Co., Richmond, Va., has been elected president of the Public Utilities Association of the Virginias. He succeeds Hugh D. Stillman, division manager, Appalachian Power Co., Huntington, W. Va., who served an extended term as president under by-laws changes adopted at the Association's 1959 Annual Meeting in September.

Also beginning their terms of office this year are: first vice-president, Eric C. Summers, executive vice-president, Monongahela Power Co., Fairmont, W. Va.; second vice-president, Charles D. Lyon, vice-president, Potomac Edison Co., Hagerstown, Md.; treasurer, William F. Keehne, assistant secretary and assistant treasurer, Appalachian Power Co., Roanoke, Va.; and assistant treasurer, Arthur T. Ellett, vice-president and general manager, Roanoke Gas Co., Roanoke, Va.

Manufacturers appoint new representatives

APPOINTMENTS of three representatives to its Southwest Region has been announced by Allis-Chalmers Industries Group. The men are Warren W. Chapman, Shreveport district; T. J. Curlee, Jr., Beaumont district; and Duane L. Miller, Amarillo district. Also announced is the appointment of James Barrett as sales representative to the El Paso (Texas) district.

The men recently completed Allis-Chalmers training course for graduate engineers.

* * *

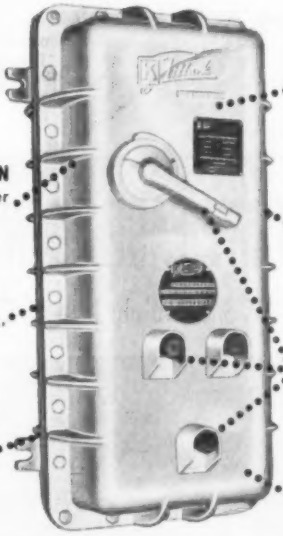
APPOINTMENT of new sales agents to represent the complete lines of Bronco portable electrical cords and cables in certain Southwestern terri-

(Continued on page 95)

Killark control enclosures are best... BECAUSE THEY WERE DESIGNED IN THE FIELD

The Result of Field Tests . . . Plant Surveys . . . Consultation with Electricians, Electrical Engineers, Contractors

EXAMPLE:
An explosion-proof combination starter:



ALL-ALUMINUM
Lightweight, non-corrosible. Efficient thermal conductivity, non-magnetic.

RIBBED CONSTRUCTION
Maximum strength, faster heat dissipation.

RECTANGULAR SHAPE
Easier installation, better fit for components.

SPLIT-BOX DESIGN
Simpler wire pulling, easier accessibility.

FRONT OPERATION
Positive handle mechanism provides for 3 locks, safety guarded start-stop reset buttons.

GROUND SURFACES
Carefully machined for tighter fit. No stripped or galled threads.

HEAVY WALLS
Hubs of any size, located anywhere you want them.

ILLUSTRATED CATALOG SUPPLEMENT—State your interest.

• Circuit Breakers • Motor Starters • Panel Boards • Disconnect Switches

Killark
KILLARK ELECTRIC MANUFACTURING CO.
Vandeventer and Easton Aves. • St. Louis 13, Mo.
Sold Through Leading Distributors:
WAREHOUSE STOCKS in NINETEEN CITIES in U. S. and CANADA!

Dates ahead

Southern Safety Conference and Exposition, Robert Meyer and George Washington Hotels, Jacksonville, Fla., March 6-8, 1960.

National Electrical Industries Show, New York Coliseum, New York City, N. Y., March 6-9, 1960.

1st National Electric House Heating Exposition, Sherman Hotel, Chicago, Ill., March 21-23, 1960.

Southeastern Electric Exchange, Annual Conference, Boca Raton Hotel and Club, Boca Raton, Fla., March 21-23, 1960.

Alabama Electrical and Electronic Exposition, Birmingham City Auditorium, Birmingham, Ala., March 21-23, 1960.

IAEI, Mississippi Chapter, King Edward Hotel, Jackson, Miss., March 28-29, 1960.

IAEI, Virginia Chapter, Mariner Hotel, Virginia Beach, Va., April 4-5, 1960.

AIEE, South West District, Annual Meeting, Shamrock Hilton Hotel, Houston, Texas, April 4-6, 1960.

Southeastern Electric Exchange, Engineering and Operation Section Conference, Roosevelt Hotel, New Orleans, La., Apr. 7-8, 1960.

Protective Relay Conference, Texas A & M College, College Station, Tex., April 11-13, 1960.

IAEI, Ellis Cannady Chapter, Carolina Hotel, Raleigh, N. C., April 12-13, 1960.

Missouri Valley Electric Association, Engineering Conference, President Hotel and Municipal Auditorium, Kansas City, Mo., Apr. 20-22, 1960.

Illuminating Engineering Society, South Central—Southeastern Regional Conference, Hotel Peabody, Memphis, Tenn., April 21-22, 1960.

Illuminating Engineering Society, Southwestern Regional Conference, Robert Driscoll Hotel, Corpus Christi, Texas, April 25-26, 1960.

IAEI, Alabama Chapter, Admiral Semmes Hotel, Mobile, Ala., April 25-26, 1960.

IAEI, Tennessee Chapter, Andrew Jackson Hotel, Nashville, Tenn., May 2-3, 1960.

Protective Relaying Conference, Georgia Institute of Technology, Atlanta, Ga., May 5-6, 1960.

IAEI, Florida Chapter, George Washington Hotel, West Palm Beach, Fla., May 5-7, 1960.

IAEI, Texas-Louisiana Joint Meeting, Five Chapters, Hotel Marshall, Marshall, Texas, May 6-7, 1960.

IAEI, Georgia-South Carolina Chapters, Joint Meeting, De-Soto Hotel, Savannah, Ga., May 9-10, 1960.

National Rural Electric Cooperative Assn., Region I, Annual Meeting, Commander Hotel, Ocean City, Md., Sept. 8-9, 1960.

Illuminating Engineering Society, National Technical Conference, Penn-Sheraton Hotel, Pittsburgh, Pa., Sept. 11-16, 1960.

National Rural Electric Cooperative Assn., Region VIII, Annual Meeting, Hotel Arlington, Hot Springs, Ark., Sept. 12-13, 1960.

National Rural Electric Cooperative Assn., Region II, An-Annual Meeting, Kentucky Hotel, Louisville, Ky., Sept. 15-16, 1960.

American Institute of Electrical Engineers, Fall General Meeting, Chicago, Ill., Oct. 9-14, 1960.

National Rural Electric Cooperative Assn., Region II, Annual Meeting, Henry Grady Hotel, Atlanta, Ga., Oct. 10-11, 1960.

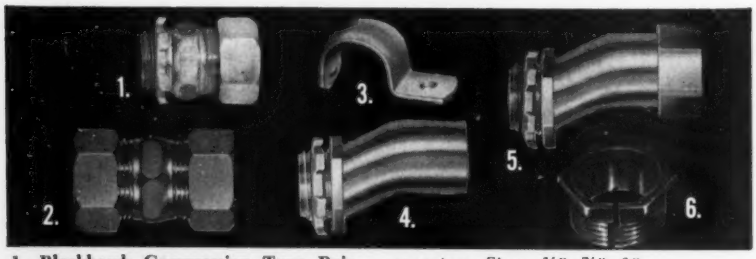
National Rural Electric Cooperative Assn., Region IV, Annual Meeting, Stonewall Jackson Hotel, Clarksburg, W. Va., Oct. 13-14, 1960.

National Rural Electric Cooperative Assn., Region X, Annual Meeting, Baker Hotel, Dallas, Texas, Oct. 17-18, 1960.

IAEI, Southern Section, Rice Hotel, Houston, Texas, Oct. 17-19, 1960.

QUALITY, ECONOMY, EASE OF INSTALLATION

— that's BLACKHAWK'S complete line of E.M.T. fittings



1. Blackhawk Compression Type Raintight E.M.T. Connector of heavy steel, cadmium and zinc finished to eliminate corrosion. Sizes: ½" to 2".

2. Compression Type Raintight E.M.T. Couplings. Blackhawk connectors and couplings feature full, true, perfect threads for ease and speed of installation. Sizes: ½" to 2".

3. Blackhawk famous Snap-Straps made to fit thinwall conduit. Snaps tighter, holds its grip. Sizes: ½" to 2".

4. Crimp type Blackhawk Offset — E.M.T. Connector. Scientifically formulated die cast alloy offset fittings are proved to be real labor-saving devices. Sizes: ½", ¾", 1".

5. Raintight Blackhawk Offset — E.M.T. conectors. Sizes: ½", ¾", 1".

6. Blackhawk Machined Split Steel Adaptor. Will adapt any female threads to the same size E.M.T. No other special parts needed. Zinc plated. Sizes: ½" to 2".

Blackhawk's new E.M.T. fittings are a product of continuing Blackhawk research and automated methods of manufacture. Order a stock today **from your electrical distributor** to meet the demand for these quality made, E.M.T. fittings.

Blackhawk Industries DUBUQUE, IOWA

where the new ideas come from

tories has been announced by Edwin B. Kanner, vice-president and general manager, Western Insulated Wire Company, Los Angeles 58, California.

In Kentucky and Southern Indiana, Bronco will be represented by Fultz & Co., 2621 Valletta Road, Louisville.

The new Bronco agency in the state of Texas is the Jack Morgan Co., Inc., located at 1013 Slocum St., Dallas 7, Texas, with a branch office in Houston, 3110 Eastside St., operated by John O. Bell, Jr.

* * *

L. MORRIS LANDERS, 251 Spring St., S. W., Atlanta, Ga., will be the Southeastern representative of Rockbestos Wire & Cable Company of

L. Morris Landers

New Haven, Conn., it was announced recently. Mr. Landers will cover Alabama, Georgia, and Florida.

* * *

THE TRANSFORMER Division of Land-Air, Inc., announces the addition of Ross D. Thomas as its representative in the Mississippi and Tennessee area. Mr. Thomas' address will be 730 M. & M. Building, 198 S. Main St., Memphis, Tenn.

* * *

WHITE-RODGERS Co., 1209 Cass Ave., St. Louis 6, Mo., has announced the appointment of Leland Sayers as electric heat advisor, a new post es-

Leland Sayers

NEW

**Pat. Pending on Entire Method and Apparatus*

Jet Line Cylinder

eliminates snaking in ½" and ¾" conduit!

The new Jet Line Cylinder makes short work of wiring ½" and ¾" conduit . . . saves up to 70% of wire-pulling costs . . . can pay for itself on one or two jobs!

Now you can lay a line through one . . . ten . . . even fifty conduits in minutes, regardless of lengths, bends, or loose obstructions! Place a line package in the conduit; secure the free end of the line. Butt the Cylinder seal-off assembly to the end of the conduit and activate the valve . . . pressure, from the expansion of a harmless gas, travels the lightweight line package through the conduit in a split second! The strong nylon line, laid by the package, is used to draw polyethylene rope, then wire, through the conduit in minutes!

The Jet Line Cylinder is safe, no inflammable substances or explosives are used, and nylon line and polyethylene rope are non-conductors.

Kit contains: Cylinder, valve, pressure regulator, valve operating mechanism, and full pressure attachment with variable head. Cylinder refillable; spare cylinders available. Order a Jet Line Cylinder Kit now . . . forget fish tape forever!

OWN THE COMPLETE JET LINE SYSTEM *

Jet Line Cylinder for ½" and ¾" Conduit • Jet Line Gun for Conduit 1" or larger

Be prepared for all conduit wiring jobs, carry the *complete* Jet Line System . . . Cylinder and Gun. SAFE, QUICK, SURE, the Jet Line System, invented by experienced electricians, has been thoroughly job tested. Compare its speed and simplicity with long hours spent in snaking . . . count the time you save in dollars!

For complete information and prices, write your distributor or

Jet Line Gun Company

615 FUGATE AVENUE, CHARLOTTE 5, N. C.

4431

tablished as a service to all who are interested in electric heating. Mr. Sayer's services as speaker, counselor or advisor are now available to equipment manufacturers, electric utilities, state educational organizations, contractor associations and similar groups.

* * *

LINE MATERIAL Industries has announced the appointment of Edwin S. Harris as apparatus engineer for

Edwin S. Harris

the South Atlantic Region. Mr. Harris, who has had experience with transformers, oil circuit reclosers, capacitors, regulators, and protective and switching equipment, will work with field engineers. His office will be at 1261 Chattahoochee Ave., N.W., Atlanta 18, Ga.

Men moving up in the industry

THREE PROMOTIONS and two retirements in Duke Power Company's General Office Distribution Engineering and Operation Department were announced recently by C. B. Miller, Jr., manager of distribution engineering and operation.

Named assistant manager of distribution engineering and operation was P. D. Huff, former assistant supervising engineer; while James W. Foster, former engineer in the distribution section, was named supervisor of distribution engineering. Henry L. Cranford, assistant electrical engineer in the distribution section was appointed supervisor of rural extension. Mr. Cranford succeeds R. H. Woods, Jr., who has retired after 45 years' service. Also retiring after 32 years of service is John J. Strickland.

A native of Piedmont, S. C., Mr. Huff was graduated from Clemson College with a degree in electrical engineering. Mr. Foster, a native of Providence, Ky., is a graduate of Chicago Tech, and joined Duke Power Company in Durham in 1948. Mr. Cranform, from Greensboro, N. C., was graduated from Duke University with a degree in electrical engineering.

* * *

HARRY FLOYD, formally Southwestern Division sales manager of NuTone, Inc., has been appointed vice-president of that company, it was

Harry Floyd

announced by J. Ralph Corbett, chairman, and Herbert Bladh, president. Mr. Floyd is a graduate of the University of Tennessee, and joined NuTone in 1953 as field representative in Memphis.

* * *

GENERAL ELECTRIC Company Vice-President Robert L. Gibson has been appointed general manager of the company's Transformer Division, with headquarters in Pittsfield,

Robert L. Gibson

Mass., according to Arthur F. Vinson, vice-president and group executive of the Apparatus and Industrial Group.

Mr. Gibson, who was formerly general manager of the company's Chemical and Metallurgical Division, succeeds Vice-President Ray W. Smith, who has resigned to accept another position.

Concurrently, Mr. Vinson an-

For the finest in friction, rubber or plastic tape, always look to ACCURATE . . . suppliers of "your best buy in tape."

Non-raveling
Straight tearing
High tensile strength
Strong adhesion
Highly insulating

ACCURATE TAPE
FRICTION ••• RUBBER ••• PLASTIC

ACCURATE MANUFACTURING CO./Garfield, New Jersey

nounced the appointment of Dr. Charles E. Reed to replace Mr. Gibson as general manager of the Chemical and Metallurgical Division with headquarters in Bridgeport, Conn. Dr. Reed had been general manager of the Metallurgical Products Department, Detroit, Mich.

* * *

IN A MOVE to strengthen top management at Day-Brite Lighting, Inc., George J. Taylor, vice-president of Eastern operations and a national authority in lighting, has been transferred to the home office as vice-president in charge of research, development and marketing.

Mr. Taylor has had wide professional recognition, including the presidency last year of the Illuminating Engineering Society. He is a Fellow of that Society, a corporate Member of the IES in England, a

George J. Taylor

Fellow of the American Institute of Electrical Engineers, and a Trustee of the Illuminating Engineering Research Institute.

J. F. Whitehead, Jr., executive vice president, also announced the appointment of William E. Gundelfinger as administrative assistant and director of manufacturing. Mr. Gundelfinger recently resigned as president of the Dazey Corp., St. Louis, manufacturers of household appliances.

* * *

WILLIAM C. MACINNES, president, Tampa Electric Co., recently announced a number of promotions and changes in the utility firm's organizational structure, including the following:

R. C. Dickinson, Jr., senior distribution engineer, Engineering Dept.; W. W. Hunsinger, assistant superintendent of production; G. P. Wood, Jr., assistant to the vice-president—sales; and V. W. Price, advertising and publicity manager.

In order to more clearly define the functions of Tampa Electric's Personnel Dept., this department was officially named the Employee Relations Department as of January 1, 1960, Mr. McInnes announced. J. E.

ELECTRIC HEATING PROMOTION

For the last 30 years, Electromode people have vigorously promoted electric heating. The merchandising concepts necessary to successful promotion of electric heat to residential, farm and industrial markets are not strange to us. We make, sell, install and service every practical type of resistance heating equipment for these markets. When it is time to launch a vigorous electric heating promotion in your area, we invite you to discuss your problems and plans with us. We would be glad to help. We are confident that we can.

® Electromode

Dept. ES-20, Division of Commercial Controls Corporation, Rochester 3, New York

Sheridan is director of employee relations; Jack Davis, director of safety and claims; and L. A. Anderson and P. Ross Wagner have been named assistant directors of employee relations.

* * *

THE BOARD OF DIRECTORS of Arkansas Power & Light Company elected Carroll H. Walsh, AP&L chief engineer, Pine Bluff, a vice-president, it was announced recently

Carroll H. Walsh

by AP&L President and Board Chairman R. E. Ritchie. Mr. Walsh, a veteran of more than 32 years of AP&L service, will be responsible for the engineering and other activities now under his supervision.

Mr. Walsh is a native of Jacinto, Dallas County, Ark., and began his power company career in 1927 as an assistant engineer. He received a degree in electrical engineering from the University of Arkansas the same year he joined AP&L.

* * *

B. B. PARKER of Charlotte was elected president of Mill Power Supply Co., recently, succeeding W. Gresham Thomas, who retired December 31, but is remaining with the company as executive consultant.

Mr. Thomas, who has been associated with Mill Power since 1917 and has acted as purchasing agent for Duke Power Co., is a native of Greshamville, Ga. He attended Georgia Tech, and was associated with Georgia Power Company before coming to Charlotte. He was one of the founders of the Carolinas-Virginia Purchasing Assn., and its first president.

Mr. Parker, a native of Union County, joined Mill Power in 1936 after graduation from the University of North Carolina. He began in the purchasing department, and was made assistant to the president in 1957.

Brief news notes of manufacturers

PANELLIT, INC., Skokie, Ill., has opened a Southwest Region office in Suite 1300, Prudential Bldg., Houston, Texas, to provide more direct service to customers in Louisiana and East Texas. This office will handle sales and service on Panellit's complete line of process control equipment, including engineering, design, and fabrication of standard and graphic panelboards, annunciator systems, and related products and services.

Joseph E. Klueger has been named sales manager, and George H. Nolte chief engineer for the Southwest Region.

* * *

DOSSERT Manufacturing Corp., Brooklyn, N. Y., is adding an additional 10,000 square feet of manufacturing area to its present facilities, plus additional machinery and increased personnel. The corporation, which has been in the electrical connector field for over 55 years, is expanding to keep pace with an increasing demand for their products, Charles Martin, president of the company, stated.

* * *

A MILLION-DOLLAR high voltage testing laboratory, one of the most advanced of its kind in the world and capable of generating up to 3,000,000 volts for impulse testing and 1,000,000 volts for indoor or outdoor 60-cycle tests has been opened by General Electric in Philadelphia.

The new laboratory is the latest addition to the company's $12,000,000 Switchgear Development Center. At the new plant, engineers will be able to simulate the effects of lightning striking a power system at the instant high voltage power circuit breakers are operating to clear short circuits.

* * *

CHANGES in Line Material Industries' sales engineering staff have been announced by E. W. Williams, vice-president of marketing.

R. W. Kelly, field engineer at Birmingham, Ala., has become supervisor of sales and service for protective equipment products. The change brings him to the Milwaukee office.

F. P. Elam, who has served as apparatus engineer in the South Central region, will handle field engineering duties at Birmingham.

* * *

THE NEW Light & Power Utilities Corporation plant in Olive Branch, Miss., will open on schedule in April, according to President Murray Reiter.

FOR OUTDOOR CONSTRUCTION, INDUSTRY, FARMS, RANCHES, MOBILE HOME PARKS!

MODEL P-55-F

New!
WEATHERPROOF
All-Purpose "FUSED"
POWER OUTLETS

MODEL P-55-F as illustrated, has a 60 amp. 250 volt, 4 wire power receptacle, protected with a two pole 60 amp. pull out block. Also has a grounded type duplex receptacle protected with a separate fuse. Top hub and bottom KO's facilitate overhead and underground connections. Completely weatherproof. Cover closes completely, when in use and can be padlocked. Also, Circuit Breaker Model P-55-C . . . same as above with circuit breaker instead of fuse.

One hundred other standard models to choose from in fused or circuit breaker types with 15 to 60 amp. 3 and 4-wire receptacles.

AT YOUR MIDWEST ELECTRIC PRODUCTS REPRESENTATIVE!

AJAX ELECTRICAL SALES CO., 1824 So. 18th St., St. Louis 4, Mo.
EDWARD W. FISHBURNE, P. O. Box 2407, Greensboro, N. C.
J. W. GATCHELL CO., 407 Broadway, Kansas City 5, Mo.
JONES-PHILIBERT & CO., 358 Sauve Rd., New Orleans 23, La.
JOHN A. KISSH METAL PROD., 1316 N. Carroll, Dallas, Texas
FRANK C. McPHERSON, 6417 7th Ave. N., St. Petersburg, Fla.
GEORGE L. WASHINGTON, 1295 N. Decatur Rd., Atlanta 6, Ga.
J. LOUIS WEYHING, 1914 Rutherford Ave., Louisville 5, Ky.

Midwest
ELECTRIC PRODUCTS, INC.
DEPT. ES
MANKATO, MINNESOTA

Construction of the $600,000 plant was delayed slightly by the steel strike, but the company has now received enough steel for completion. Two crews have been assigned to the project to complete the steel framework, cutting this part of the building time in half. Howard Sowell, president of Dixie Steel Building, Inc., general contractors, expects to complete this work in January.

* * *

A NEW ORLEANS sub-office has been announced by the Clark Controller Company, Cleveland, Ohio.

Located at 1122 Dryades Street, New Orleans, the new office will serve southern Louisiana below Vernon, Rapides and Avoyelles parishes and the border of Mississippi.

It will be operated by Butler & Land, and will be under the direction of R. F. Davidson.

* * *

LOUIS DUMAN, president of Advance Transformer Co., has announced plans for another addition to the Advance plant at 2950 N. Western Ave., Chicago. This is the second addition this year and will house the company's Star Metal Products division. The addition will be of steel truss and concrete construction and provide roof parking for over 300 cars.

Advance Transformer Co., one of the world's largest independent manufacturers of fluorescent lamp ballasts, recently joined the Consolidated Electronics Industries Corp.

Engineering heads retire from service

THREE CUTLER-HAMMER engineering executives, sharing a total of 135 years with the company, retired recently. They are P. B. Harwood, a senior vice president; J. L. Defandorf, general supervisor of engineering; and C. T. Evans, consulting engineer.

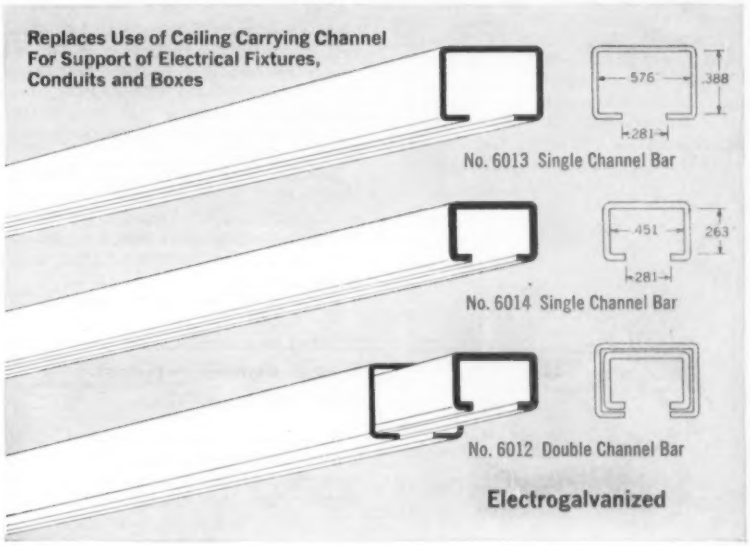
Harwood, who joined Cutler-Hammer in 1917 after graduation from the Carnegie Institute of Technology, has played a major role in the electrical concern's engineering activities and is the author of "Control of Electric Motors," a widely used college textbook. Harwood became Cutler-Hammer's manager of engineering in 1939 and in 1945 was elevated to engineering vice president. His appointment as a senior vice president came earlier this year.

A Johns Hopkins graduate, Defandorf also started with the Milwaukee firm in 1917. He was advanced to supervising engineer in 1927, a post he held until appointed to his present position in 1945.

Evans, who received his engineering degree at Ohio State University, has been with C-H since 1908 as a development engineer and holds some 50 patents.

NEW STEEL CITY CHANNEL BAR

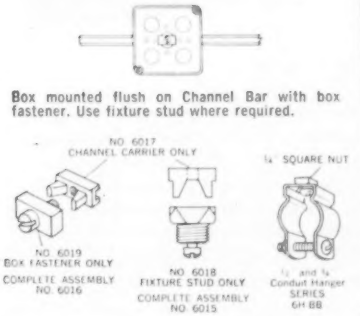
Mounts Fixtures, Boxes and Conduits in Suspended Ceilings



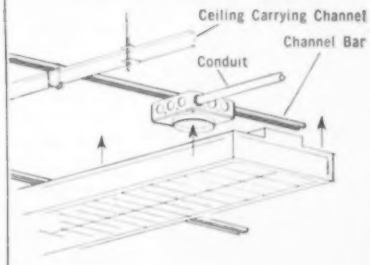
Steel City All-Purpose Channel Bars

Practical and economical for electrical installations in suspended ceiling construction. Slotted opening permits easy positioning of 6H-BB Conduit Clamps, standard 1/4" Square Nut and Threaded Rod or No. 6017 Channel Carrier using either No. 6019 Box Fastener or No. 6018 Fixture Stud to secure box. Designed in two sizes for maximum utility—used separately or as double channel. Packaged ten—10' lengths.

Simplified Hanging with Standard Electrical Fittings


Box mounted flush on Channel Bar with box fastener. Use fixture stud where required.
NO. 6017 CHANNEL CARRIER ONLY
1/4" SQUARE NUT
NO. 6019 BOX FASTENER ONLY
COMPLETE ASSEMBLY NO. 6016
NO. 6018 FIXTURE STUD ONLY
COMPLETE ASSEMBLY NO. 6015
1/2" and 3/4" Conduit Hanger SERIES 6H-BB

Typical Installation of Surface Mounted Fixture



Box on Channel Bar feeds and supports surface mounted fixture.

Available now through leading electrical distributors

Write for Free Samples and Technical Bulletin

STEEL CITY ELECTRIC COMPANY

A Subsidiary of American Marietta Company

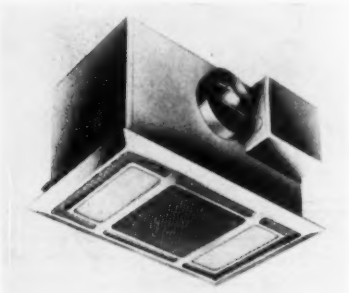
PITTSBURGH 33, PA.

New products

Three-way bathroom heater gives light, ventilation

A NEW ADDITION by the Hunter Division-Robbins & Myers, Inc., 2500 Frisco, Memphis 14, Tenn, to the line of portable and installed electric heating and ventilating equipment is a three-way bathroom heater, light, and ventilator, recently introduced at the Housewares Show in Chicago.

Through one low-cost installation, the new heater provides three bathroom requirements in a compact unit featuring a snap-on, chrome-finished cover with decorative honeycomb grille and translucent light diffusers.



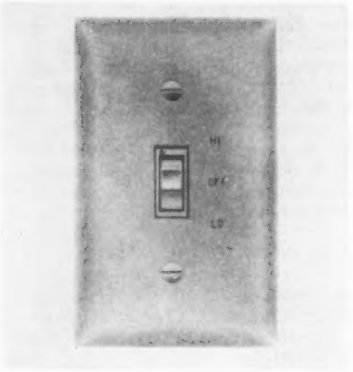
Quick heating action desirable in bathrooms is provided by nichrome ribbon heating elements which glow red instantly when heater is turned on. A reversible fan delivers heated air into the room. The heating unit operates on regular 115-volt house current at 1450 watts to produce 4949 BTU/hr.

Thorough ventilation is achieved by the highly efficient axial flow exhaust fan which quietly pulls air through the unit and into a standard 4-inch duct for horizontal discharge to the outside.

Write P-213 on reply card, pg. 17

Simple dimmer replaces home light switches

A DIMMER SWITCH using an electronic circuit is now being introduced as a revolutionary concept of light control by the Slater Electronics Corp., 45 Sea Cliff Ave., Glen Cove, L. I., N. Y. Called the HI-LO Dimswitch, the product is designed to increase both efficiency and economy in indoor and outdoor lighting.



The new dimmer control was created to give immediate control from the center or off position to high 100% bright lighting—or from this same center position to dim 30% lighting, by a single flick of the switch handle. This eliminates the necessity of going through one light level to reach another.

The new dimmer control, which operates on a semiconductor-diode principle, gives over twenty times the length of service from an ordinary light bulb (except fluorescent) when used in the dim position.

No elaborate wiring or plastering is needed since the product is attached to regular commercial wiring and is easily installed by simply replacing the ordinary switch with the dimswitch.

Write P-214 on reply card, pg. 17

Post lantern series shows new styling

THE NEW Imperialite post lantern, made of black and brass aluminum by the Emerson Electric Manufacturing Co., 8100 Florissant Ave., St. Louis 36, Mo., is one of 28 different out-of-door lights featured in that company's new catalogue.

Model 421, a post lantern 11½ inches high with a 21-inch spread, is designed to fit a standard 3-inch

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CEILHEAT Radiant Heating Cables

DRI-CEIL for dry-walls

Aristocrat for plaster

AJAX for concrete

CEILHEAT, INC., Knoxville, Tennessee

(manufacturers of a complete line of electrical heating products)

post. It combines opal glass with a 150-watt lamp.

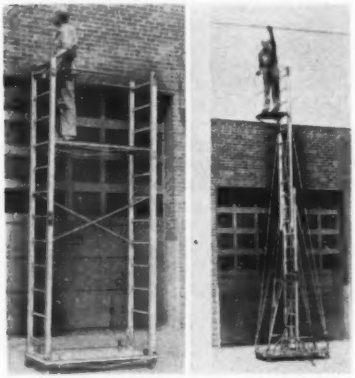
The new outdoor line of Imperialites consists of a wide variety of colored and modern styled post lanterns in frosted, clear, or textured crystal glass; coach-style and modern wall lanterns, and a wide selection of ceiling hall, porch, or utility outdoor fixtures.

Write P-215 on reply card, pg. 17

Scaffold, extension ladder, hand truck all in one unit

ATLAS Industrial Corp., 849 - 39th St., Brooklyn 32, N. Y., announces the introduction of the new Atlas Omni-Reach, one of the most versatile scaffolds ever offered.

It is not just a scaffold, but 6 different pieces of equipment, including



a straight extension ladder, a telescopic scaffold, an adjustable scaffold with a large platform, a hanging scaffold, an electrically operated hanging scaffold, and a dolly and hand truck.

This new Atlas Omni-Reach is ideal for painting, cleaning, and all maintenance work. It changes from a ladder to a scaffold to a hand truck in just a few minutes.

This equipment is light enough for one man to handle. Fits through any ordinary doorway, and fits into an automobile. Sturdy aluminum and steel construction assures absolute safety.

Write P-216 on reply card, pg. 17

Budget fixture has efficiency, beauty

TO SATISFY the demand for a budget-priced recessed fixture line that combines efficiency and attractiveness, Minute Mount has designed a new series with luxury lenses and diffusers. Minute Mount is a division of the Progress Manufacturing Co., Inc., Castor Avenue and Tulip St. Philadelphia 34, Pa.

This new series offers a selection of fresnel lens, drop opal or satin

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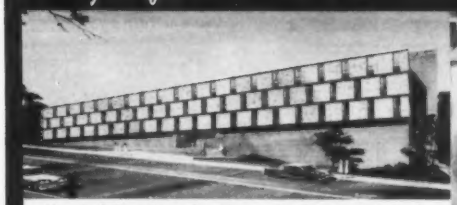
Sun-Tron ELECTRIC HEAT

now heating many types of buildings:
- Ranch Homes
- Split-Level Homes
- Two-Story Homes
- Apartment Buildings
- Room Additions
- Offices
- Institutions
- Motels



Hospital Dormitory for Nurses (under construction)

Ranch House Room Addition

Radiant Wall and Baseboard Panels with "A Size for Every Room". Available in 6 convenient sizes: 48x6, 30x9, 36x9, 36x14, 72x9, 36x18. Your choice of: oak, mahogany-walnut, beige-tone, pearlized grey finishes.

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- Most Convenient Utilization
- Simplicity of Installation
- Ultimate in Comfort

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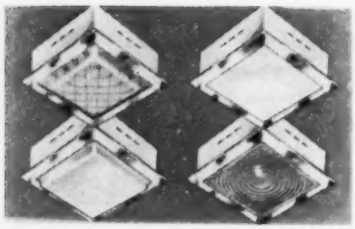
(February 1960)



frosted Bent glass, or standard flat glass diffuser in easy to install recess fixtures.

Many features of higher-priced recess boxes are incorporated in the line at low prices. A reflector with exclusive reflective coating produces maximum light output with minimum glare. Air vents on all sides of the recessed box provide extra ventilation for longer lamp life.

Write P-217 on reply card, pg. 17

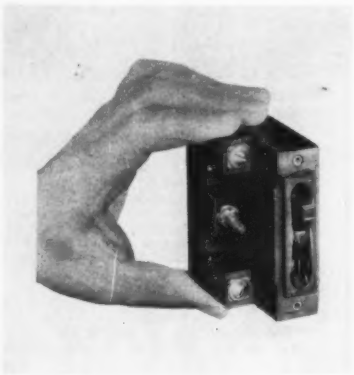
Manual power switch is electrically tripped

A MANUAL POWER switch that can be electrically tripped by practically any type of power from a remotely-located control or safety device has been announced by the Heinemann Electric Co., 361 Plum St., Trenton 2, N. J.

Referred to as an electrically- tripped power switch, this product is an adaptation of the firm's hydraulic-magnetic circuit breaker, but with the breaker contacts electrically isolated from the coil. Consequently a limit control, timer, malfunction detector, or overload condition in one circuit can cause tripping in another, interlocked, control circuit.

The new combination power switch-control interlock has an interrupting capacity of 2,000 amperes at 125 volts a-c. It is available with either a current or voltage-sensing coil.

The electrically-tripped power switch has been used for such things as a timing cut-off on a copying machine and a malfuntion shut-down on a bowling pin spotter.

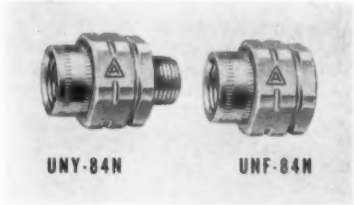


Write P-218 on reply card, pg. 17

Explosion-proof union gives safety to rigid conduit

A NEW EXPLOSION-PROOF union for use in installing rigid conduit has been introduced recently by Appleton Electric Co., 1701 Wellington Ave., Chicago 13, Ill.

The union is a small style male and female device which is heavy gage



in weight, and which removes the danger from installing rigid conduit and fittings in hazardous areas.

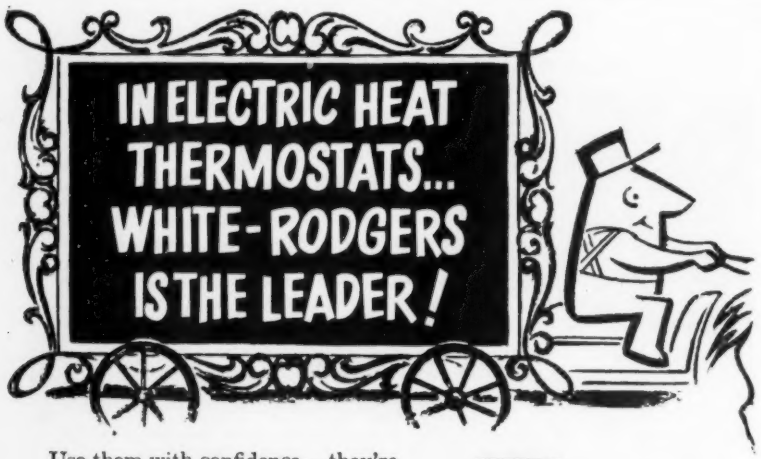
This explosive-proof union is built only in ½-inch size at present. It is listed by Underwriters' Laboratories, Inc., for Class 1, Groups A, B, C, and D, and for Class 2, Group E, F, and G.

Write P-219 on reply card, pg. 17

New concept in drive tools features force, less danger

A NEW CONCEPT in drive tools has been incorporated into a new model featuring transmission of maximum force without the danger of free-flying fasteners.

Made by Hilti of Florida, Inc.,



Use them with confidence—they're specifically designed for Electric Heat by White-Rodgers—world's largest maker.

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ATLANTA 8, GEORGIA • 732 Spring St., N. W.

Rapid Fastening Systems Division, 2629 Central Ave., St. Petersburg, Fla., the new concept uses a power-assist behind a drive piston instead of behind the fastener.

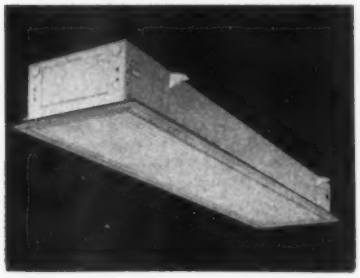
The featured DX-100 model drive tool, made of fine tool steel, is specifically engineered to work easily, quietly, and safely under the most strenuous job requirements, including overhead fastenings. This model is designed to use the largest assortment of available fasteners for most installations where threaded studs, drive pins, and drive ring fasteners are used in lengths up to four inches. The DX-100 is also approved for use by trade unions, management, and government agencies.

Write P-220 on reply card, pg. 17

New fluorescent troffer series now available

A NEW SERIES of fluorescent troffers is now available from the Pittsburgh Reflector Co., Westmoreland Ave., Irwin, Pa. These new units are designed and engineered for installation in plaster ceilings or in any of the more than 66 other ceiling types listed in Sweets Catalog.

Appropriately named the "Universal II" series, the new lighting units



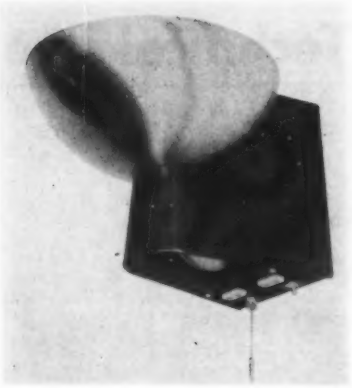
are only five inches deep. They are available for either rapid start or slimline lamps, in a complete range of closures.

The new "Universal II" troffers are offered in four and eight foot basic unis, and extension sections with convenient connectors for continuous runs. All housing parts are die-formed from 20-gauge steel and prefinished by the Bonderite iron phosphate process. The finishing coat is a hot bond sprayed and baked synthetic white enamel with 89% reflectance. The units are shipped fully assembled and completely wired for immediate installation.

Write P-221 on reply card, pg. 17

Patient room light has flexible uses

A DECORATIVE over-bed light combining all electrical functions in one compact unit is now being introduced to the market by Kurt Versen, Inc., Englewood, N. J.



Designed for use in patient room, the light provides general room illumination, reading light, convenient outlets, and a night light. There are no moving parts, and the unit is almost maintenance free, according to the manufacturers.

Lighting elements are controlled in such a way as to give optimum illumination levels without excessive brightness, while the appearance leans toward a modern home-like decoration.

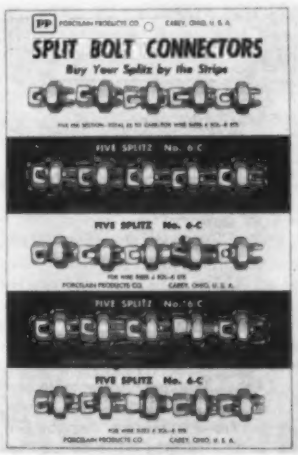
Write P-222 on reply card, pg. 17

Self-displaying cards now sell connectors

NEW SELF-DISPLAY packaging of connectors and lugs is now available to the electrical trade, it has been anounced by Porcelain Products Co., 225 N. Patterson St., Carey, Ohio, a supplier of these products. This new method of packaging, which the company calls "Skin-Pak," consists of colorful display cards to which the connectors are held in rows by means of a transprent "skin" of crystal clear plastic.

The Skin-Pak cards are of a handy size, punched for hanging on pegboard hooks.

Write P-223 on reply card, pg. 17



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Technical books

for the electrical man

Basic electricity

Fundamentals of Electricity," Fourth Edition, by K. C. Graham. Published by American Technical Society, 848 East Fifty-Eighth St., Chicago 37, Ill., 342 pages, illustrated, $4.75.

LONG a guide to understanding electrical principles, Fundamentals of Electricity has now been fully revised and expanded to keep pace with developments being made in the field.

The electron flow theory of electricity has been used as the basis of the presentation, and the greatest effort has been made to develop concise, understandable explanations of basic principles. Each principle has been well-defined and its applications fully explained. Supplementing the text are hundreds of illustrations, including many diagrams and schematics, all of which conform to ASA Graphical Standards.

Beginning with the nature of electricity and continuing through all the principles, this book provides the reader with a solid foundation of electrical fundamentals. The latter chapters relate these fundamentals to modern applications of electricity.

For example, the completely new chapter on electric waves begins with basic considerations and touches upon the modern intercommunication system, the television transmitter, the television camera tube, radar, and others. There is also a new chapter on automation electrical devices which explains the applications of electrical principles for automatic business and industrial machinery.

Motor rewinding

"Connecting Induction Motors: Operation and Practice," by A. M. Dudley and Samuel F. Henderson. Published by McGraw-Hill Book Company, Inc., 327 West 41st St., New York 36, N. Y., 425 pages, 433 illustrations, $13.50.

This newly published revised edition of a standard book presents an up-to-date treatment of the operation and repair of single and polyphase induction motors.

The book explains the principles involved in the operation and performance of the induction motor—how the input as electrical power is converted to output at the shaft in the form of mechanical power—and gives a clear picture of the rotating magnetic field. The influence of various changes in the electrical input on motor performance are described.

New in the fourth edition are chapters on part-winding starting connections, single-phase connections, multi-speed polyphase motors, and the use of performance characteristics information on the name plate for maximum potential use of the motor. The book includes tables of voltages showing how connections may be changed for any combination of phases and voltages. It also includes over 400 illustrations and diagrams.

Electrical reference book

"Handbook of Electronic Tables and Formulas," by the Sams Engineering Staff. Published by Howard W. Sams and Co., Inc., Indianapolis 6, Indiana, 134 pages, $2.95.

This new and practical reference work has been especially prepared to meet the needs of electronic technicians, engineers, students, hobbyists, and anyone interested in the subject. It contains those tables, charts, formulas, and laws that are essential for all who work in electronics. Five comprehensive sections include: formulas and laws of electronics; constants, standards, symbols, codes; service and installation data; miscellaneous data. A full-color, six-page fold-out contains a frequency spectrum chart based on latest 1959 FCC allocations. For the first time, most of the reference-type data needed for electronics work is bound into one handy volume.

School heating report

"Modern Schools Are Heated Electrically," by the Electric Space Heating and Air Conditioning Committee of the Edison Electric Institute, 750 Third Ave., New York 17, N. Y., 20 pages, illustrated, $1.25.

This booklet, printed in two colors and plastic-comb bound, is the second such report published by Edison Electric Institute on this subject. Prefaced by a section outlining the advantages of electric heat in schools, the report lists 212 schools in 29 states which have installed electric heating facilities. Reports on three Canadian schools are included in the booklet. Data include the number of classrooms and other rooms, connected heating load, type of heating equipment, degree days and date of installation.

Material was complied from information provided by EEI member companies, 22 manufacturers of electric heating equipment and various educational agencies.

Helpful literature

available to our readers

Bulletin PL6200, 16 pages, illustrating advantages and adaptability of **a-c motor control centers** and including "plan-it-yourself" forms and instructions is available from **Clark Controller Co.**, 1146 E. 152nd Street, Cleveland 10, Ohio.
Write B-224 on reply card, pg. 17

A new catalog of **annunciator systems** is now available from the **Pan-Alarm Division of Panellit, Inc.**, 7401 N. Hamlin Ave., Skokie, Ill., producers of industrial annunciators and process-control information systems. The free catalog 100-c, provides one of the most comprehensive single source of information on annunciator systems ever published.
Write B-225 on reply card, pg. 17

Bulletin GEA-6985, published by **General Electric Co.**, Schenectady 5, N. Y., describes the construction, operation and application of G-E Form E **discharge counter** for automatically recording station and intermediate-class lightning arrester operations. Publication includes dimensional and line drawings, photographs, and equipment table.
Write B-226 on reply card, pg. 17

The Light Idea Catalog, a 52-page booklet in full color, shows the new line of Virden **residential lighting fixtures** in traditional, modern and contemporary designs. Also, "light idea" suggestions showing how to use the new fixtures. Write to **Virden Lighting**, 5209 Euclid Avenue, Cleveland 3, Ohio.
Write B-227 on reply card, pg. 17

A new, up-to-date, **ballast cross reference guide** has been published by the **Universal Manufacturing Corp.**, Dept. GEB, 29-51 E. Sixth St., Paterson, N. J., maker of fluorescent lamp transformers. The new chart shows the Universal catalog number equivalents for ballasts of other manufacture. It also contains a ballest rating table and other important information regarding mounting dimensions, individual cartons, code dating, etc.
Write B-228 on reply card, pg. 17

Planning the **outdoor lighting** for parking areas, construction sites, shopping centers, farm yards, and other open areas can be done with ease, using Bulletin 2719, published by **Crouse-Hinds Co.**, Syracuse 1, N. Y. Aptly titled "Area Floodlighting Made Easy!", the 16-page booklet gives quick reference guides for selecting incandescent or mercury floodlights, general purpose or heavy duty types, and for determining how many floodlights are needed based on the size of the area to be lighted.
Write B-229 on reply card, pg. 17

Wall mounted fluorescent and incandescent **lighting fixtures** for exterior and interior use are illustrated and described in Folio R-60, published by **Gruber Bros., Inc.**, 90 S. First St., Brooklyn 11, N. Y. This 16 page catalog, in color, is comprehensive and contains data on over 70 "Reflectolite" units with complete specifications and mounting details. Applications include cove lighting, over Bulletin-Directory, corridors, critical work areas, bank desks, etc.
Write B-230 on reply card, pg. 17

Aluminum interlocked **armor cable** is described in detail in a new booklet published by **Kaiser Aluminum & Chemical Sales, Inc.**, Kaiser Bldg., 1924 Broadway, Oakland 12, Calif. Besides offering specifications for the company's interlocked armor cable constructions, the booklet contains current carrying capacity charts for aluminum and copper power cables insulated with various materials.
Write B-231 on reply card, pg. 17

New color bulletin F50100, published by **Edwin L. Wiegand Co.**, 7500 Thomas Blvd., Pittsburgh 8, Pa., fully describes and illustrates the commercial grade of Chromalox electric **baseboard heaters**, type BBC, ideal for schools, motels, churches, offices, apartments, bowling alleys, restaurants and hospitals.
Write B-232 on reply card, pg. 17

Bulletin GEA-6070D, 24 pages just out from **General Electric Co.**, Schenectady 5, N. Y., gives detailed information on the ten major features of G-E's new 1959 **distribution transformer** and describes its operation and installation. Topics include Permalex insulation, Formex wire, Melalast finish, H-V bushing, AL/CU terminals, Strenicor clamps, impulse testing, etc.
Write B-233 on reply card, pg. 17

Smithcraft Lighting, Chelsea 50, Mass., has made available a new four-page folder that presents condensed information on many of the most popular units in the complete Smithcraft line of commercial and industrial fixtures, recessed troffers and ceiling systems. The new folder, described as a handy reference guide for all lighting specifiers, is con-

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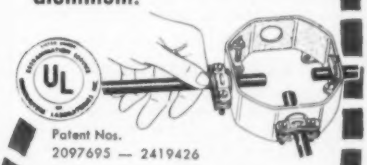

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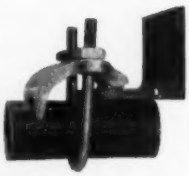

This clamp is made of malleable iron, cadmium plated to prevent rust and has a safety bite of case hardened tool steel.

Two models—right angle and parallel—each in 11 sizes to handle pipe or conduit ⅜" thru 4".

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cisely written and includes illustrations of the highlights of the Smithcraft **fluorescent lighting** equipment line.

Write B-234 on reply card, pg. 17

A completely revised bulletin on **portable and power cables** for the mining industry has been issued by **General Electric's** Wire and Cable Department, Bridgeport 2, Conn. The booklet covers portable and power cables for use in underground mining, both a-c and d-c systems, and for strip mining and pits and quarries, as well as heavy portable cables for gantry cranes, earth moving equipment, and the like.

Write B-235 on reply card, pg. 17

A new brochure on the manufacturing of quality sound-rated, **dry-type transformers** has recently been published by **Sorgel Electric Co.,** Titled "The Profile of Sorgel Electric Co.," it is composed of product illustrations, transformer data and manufacturing facts.

Write B-236 on reply card, pg. 17

An eight-page booklet cataloging wall and utility **fluorescent lighting** has just been issued by **Lightolier Inc.,** 346 Claremont Ave., Jersey City, N. J. Introducing Reflect-A-Line and Prismalux bath brackets, this brochure outlines specifications for Lyteline and Sightron units.

Write B-237 on reply card, pg. 17

A handy new catalog just issued by **Stonco Electric Products Co.,** 333 Monroe Ave., Kenilworth, N. J., condenses a good general cross-section of their complete line of cast aluminum **outdoor floodlights** into eight pages. Included are illustrations, specifications and dimensional drawings.

Write B-238 on reply card, pg. 17

Residential UG

(Continued from page 60)

operate on a 15 kv grounded neutral system. Over the insulation will be a semi-conducting tape and a shield composed of a sufficient number of spirally wrapped wires to provide a full capacity neutral wire. A jacket over the shield will be applied for protection against corrosion. This type of cable will save some on installation costs, inasmuch as both conductors will be laid with one operation.

For secondary cables we plan to use a rubber insulated, neoprene jacketed cable which we now use for services on our network system. Secondary runs will be very short inasmuch as only four services will be fed from one transformer.

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cables in the trench is as follows: The secondary cables will be in conduit to facilitate changing the size of conductors as the load increases. Both primary cable and secondary conduit will be buried in 6 inches of sand topped with a 2-inch slab of concrete. The telephone cable will be above and on the opposite side of the trench from the power company's conductors.

It is estimated that under certain conditions as previously outlined, the service to the addition now under consideration can be installed for $500 per lot, exclusive of transformers, as compared to $120 per lot for overhead construction or a ratio of approximately 4 to 1.

Single-pole line

(Continued from page 55)

steel strand with an ultimate strength of 14,300 lbs., installed so that maximum tension will not exceed 40% ultimate with loading of ½-inch radial ice and 8 lbs wind.

The conductors for the 34.5 kv line will be 336,400 CM ACSR 18 al./1 steel strand installed so that the maximum tension will not exceed 2,000 lbs. under conditions of ½-inch radial ice and 8 lbs of wind.

The shield wire is 3/8-inch high strength galvanized steel installed so that initial tensions at 60° F. will not exceed 16% of ultimate strength.

Insulation and clearances

Insulator strings consist of nine, 15,000 lb. units for both suspension and deadends, and the impulse strength of the structures is limited to 1,500 kw by the air gap distance between the shield ground connection and the conductor.

Minimum ground clearances and clearances over other wire lines, railroads, etc., are designed to conform to the National Electrical Safety Code.

Code discussion

(Continued from page 48)

of ELECTRICAL SOUTH at the same time that changes in high voltage services were discussed.

In Article 720 (Circuits of less than 50 volts) Section 720-2 is new. It requires circuits and equipment of less than 50 volts which are installed in hazardous locations to comply with the requirements listed in Articles 500 to 517 for such locations.

Article 730 (Outside circuits and feeders) has many new references, especially to Article 230 on services; and in this shuffle, the former requirement of old Section 7352 has been lost. It did state, "Underground conduits or ducts, when not located below the frost line shall be arranged to drain."

In Article 810 (Radio and TV) the size of a receiving station grounding conductor has been increased by a revision of Section 810-28. The minimum size is now No. 10 copper, No. 8 aluminum, or No. 17 copper-clad steel or bronze. Section 810-59 has increased the minimum size to No. 10 for protective grounding conductors for transmitting stations whether copper, bronze, or copper-clad steel. Aluminum is not mentioned in the latter section.

This completes our review of the changes occurring in the new 1959 Code. In the next issue, we will continue our series of studies on understanding the Code.

Answers to Code test questions: (1. **T** Section 430-31-a) (2. **T** Section 430-31-b) (3. **F** Section 430-83-Exception No. 1) (4. **T** Section 430-83-Exception No. 3) (5. **F** Section 501-4-b) (6. **c** Section 501-5) (7. **a** Section 501-8-b) (8. **a** Section 511-6-b) (9. **b** Section 517-6-d) (10. **c** Section 520-4).

Temporary power

(Continued from page 38)

this type of set-up, rain and snow could cause shorts, and sometimes these resulted in injuries to persons without experience attempting to correct the damaged power systems which were improperly installed in the first place.

Open systems also invited the curiosity of children, especially in trailer camps. The new requirements for temporary service poles eliminates such hazards.

The drawing in the diagram provided by Mr. Darrah indicates all of the receptacles he recommended for use in Dallas. The 30-ampere, 220-volt polarized receptacle was insisted upon because it can be used by floor sanders. Nine distinct requirements were recommended, and recently it became mandatory that all cabinets be weatherproof.

Other Texas towns, including Marshall, Garland, and Grand

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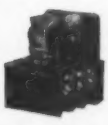

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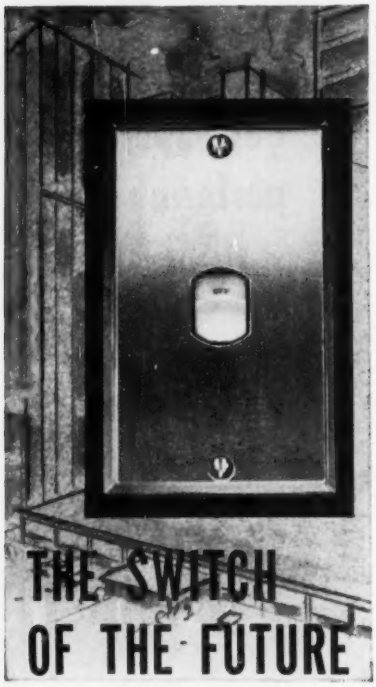

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Prairie, have now made the same general recommendations to their local contractors, but have chosen receptacles to fit their particular requirements.

Time-saving tools

(Continued from page 36)

together—excellent publicity for Roper.

Some recent Roper jobs include the Fine Arts Building of the Southwest State Teachers College and a hospital.

"Our successful completion of a considerable number of larger jobs which we have bid successfully and profitably during the last five years has been due largely to our liberal tool policy," Mr. Roper reports. "You can bid with confidence when you have the proper tools in the warehouse and satisfied crews of competent craftsmen who know that we will go as far as possible to provide them with comfort and power tools of most modern design."

Service subsidies

(Continued from page 29)

equal wiring for new homes, the company felt it could not afford to invest a larger amount in this area, since value of the new wiring facilities in each case would be equal.

To protect homeowners, the company requires that all installations of service entrance facilities must meet or exceed local and National Electric Code requirements; and to protect the company, home owners must contact the Georgia Power Company and sign the necessary agreement papers before the start of a new or rewiring installation.

Code questions

(Continued from page 33)

wire in conformity with requirements of the utility company?

Answer: Section 210-20 applies as there can be no overload and only fault currents need be anticipated; consequently overcurrent protection for the wire only is required.

Question. Where may inspectors obtain information regarding temperature limitations on various types of cords.

Answer: Standards of Underwriters Laboratories Inc.

Article 250. Would a concrete slab at grade, covered with asphalt, rubber or vinyl tile be considered as conductive?

Answer: Yes.

Section 250-57, 250-59. How shall outlets installed above such surfaces be grounded?

Answer: In accordance with these sections, depending on wiring method used.

Section 410-65(b) (2). How close may 60 degree conductors terminate from a fluorescent fixture marked "supply conductors shall be rated 75 degrees C"?

Answer: Twelve inches.

Section 230-43. What Section, if any, would prohibit the meter loop from being run down and back up through the same conduit?

Answer: Not prohibited if the loop is on the supply side of the service disconnecting means and overcurrent protective devices. Other provisions are also mentioned.

Section 230-43. When a panelboard, containing a main switch and fuses, is used as service equipment, is the gutter space adjacent

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to the main switch, into which the service conductors are entered, to be considered as a section of the service raceway?

Answer: Yes.

Section 230-43. In the above question, is it permissible to run the branch circuit conductors through the space containing the service conductors?

Answer: No.

Section 240-16. In a hotel, must the branch circuit overcurrent protective devices be located on the same floor as the load supplied?

Answer: No.

Computer wiring

(Continued from page 27)

continuous load of one hundred amperes. Ninety ampere and one-hundred-fifty ampere circuits, respectively, were installed, using three-phase conductors, plus an equipment grounding conductor for each circuit, in flexible metal conduit.

The other twenty-four computer components receive power through the maze of inter-connecting cables from the eight master units. Fusible panel boards and switches were selected in preference to circuit breakers to afford a more rapid flexibility for revising branch circuits to accommodate new arrangements and additions. Spare switches were also maintained to permit the doubling of the computer system through normal growth during the next few years.

Inasmuch as low-current transisters have already begun to replace vacuum tubes in electronic computers, it is anticipated that the present feeders will be adequate to serve two complete computer systems of the production of the year 1962. The #705 system now installed contains over 3500 vacuum tubes.

Air conditioning system

The tremendous heat rejection of the computer, plus the fact that steam re-heat is used to maintain a critical humidity requirement, dictates a cooling load and an air volume considerably beyond the range of the normal applications. Air conditioning is supplied through two separate systems, each of which has a special air filtering arrangement.

The under-floor system has a capacity of 48 tons, and circulates 16,000 cubic feet per minute of sixty-five degree air directly through the electronic units. The overhead system has a capacity of 26 tons, and circulates 11,000 cubic feet of air per minute, to absorb direct radiation, heat gain from people and from the outside walls, and to maintain room conditions at seventy-five degrees. Cooling will always be required, regardless of outside temperature.

For each system 100% standby is provided in the form of a duplicate spare condensing unit, which is wired, piped, and ready to go at the flip of a switch. The control and interlock wiring of the air conditioning system is so complex that it was necessary to install a 4" x 4" wireway down the center of the air conditioning equipment room to accommodate just the control and pilot light circuits. The temperature and relative humidity of both systems are constantly recorded on electronically actuated charts. If the temperature or humidity go out of range on either system, the computer must be stopped until normal conditions are restored.

Washington report

(Continued from page 21)

taxable are those made strictly on a personal basis."

The courts don't always agree. One case before the Supreme Court involves the gift of a Cadillac by the president of one firm to the head of another who had given him a list of potential customers. The Internal Revenue Service tried to collect income tax, but a lower court held the Cadillac a tax-free gift.

Expense account to get tougher tax inspection

THE INTERNAL Revenue Service wants to take a close look at expense accounts of small businessmen and corporations in 1960. The reason, according to the Service: a growing trend in corporations, partnerships, and small business to claim deductions for personal expenses of officers and employees.

The crack-down on expense account records started Jan. 1. Revised business tax forms will seek information about: trips by relatives to conventions and business meetings; vacations for officers and employees; use of yachts, hunting lodges, and resort property; and the like.

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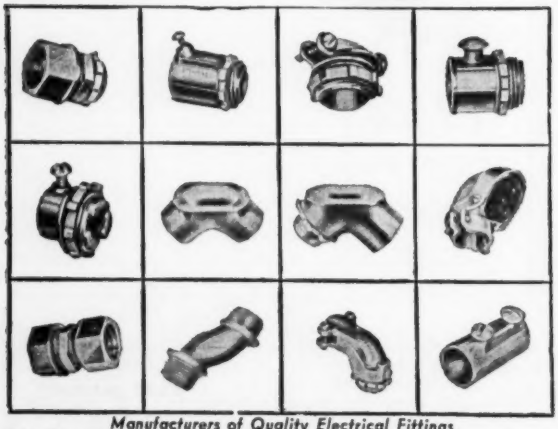

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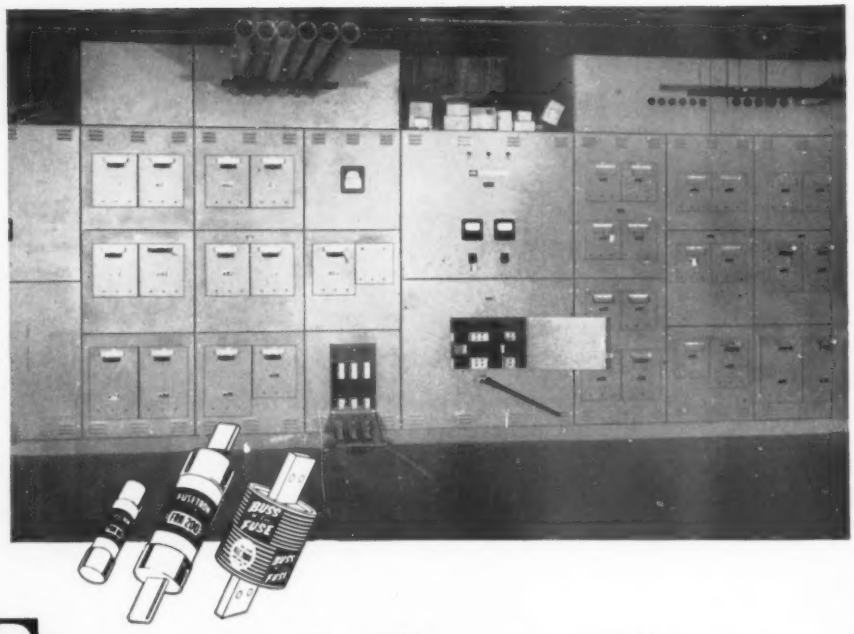

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